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ELLIOTT & ELLIOTT, P.A.

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SCOTT ELLIOTT

TELEPHONE (803) 771-0555
FACSIMILE (803) 771-8010

February 17, 2005

VIA HAND DELIVERY
Mr. Charles Terreni
Chief Clerk of the Commission
SC Public Service Commission
P. O. Drawer 11649
Columbia, SC 29211

RE: Application of Midlands Utility, Inc. for an approval of New Schedule of Rates and Chares for Sewage Service provided to its customers in Richland, Lexington, Fairfield and Orangeburg Counties.
Docket No.: 2004-297-S

Dear Mr. Terreni:

Enclosed please find the original and twenty-five (25) copies of the **Rebuttal Testimony of Keith G. Parnell** and the original and twenty-five (25) copies of the **Rebuttal Testimony of Charles K. (Ken) Parnell** filed on behalf of Midlands Utility, Inc. in the above referenced docket. By copy of this letter, I am serving all parties of record.

I have enclosed an extra copy of this testimony which I would ask you to date stamp and return to me by my courier.

If you have questions or need additional information, please do not hesitate to contact me.

Sincerely,

Elliott & Elliott, P.A.

Scott Elliott

SE/jcl
Enclosures
c: All parties of records w/enc.

CERTIFICATE OF SERVICE

The undersigned employee of Elliott & Elliott, P.A. does hereby certify that he has served below listed parties with a copy of the Rebuttal Testimony of Keith G. Parnell and Charles K. (Ken) Parnell on behalf of Midlands Utility, Inc., indicated below by hand delivery:

RE: Application of Midlands Utility, Inc. for an approval of New Schedule of Rates and Chares for Sewage Service provided to its customers in Richland, Lexington, Fairfield and Orangeburg Counties.

Docket No.: 2004-297-S

PARTIES SERVED:

Florence P. Belser, Esquire
ORS
P. O. Box 11263
Columbia, SC 29211

Wendy B. Cartledge, Esquire
ORS
P. O. Box 11263
Columbia, SC 29211

Charles H. Cook

February 17, 2005

172788

THE PUBLIC SERVICE COMMISSION

OF

SOUTH CAROLINA

DOCKET No.: 2004-297-S

Application of Midlands Utility, Inc. for an approval of New Schedule of Rates and Charges for Sewage Service provided to its customers in Richland, Lexington, Fairfield and Orangeburg Counties.

PREFILED REBUTTAL TESTIMONY

OF

CHARLES K. PARNELL

February 17, 2005

REBUTTAL TESTIMONY OF
CHARLES K. (KEN) PARNELL
FOR
MIDLANDS UTILITY, INC.

DOCKET NO. 2004-297-S

Q. Please state your name, business address and occupation.

A. My name is Charles K. Parnell. My business address is 1432 Sunset Boulevard, West Columbia, SC 29169.

Q. Please provide your educational background and work experience.

A. I graduated in 1978 with a Bachelor of Science in Engineering from the University of South Carolina. I obtained my Master of Engineering from the University of South Carolina in 1995. I am a registered professional engineer (South Carolina Registration No. 9406). My professional affiliations are as a member of the American Water Works Association (AWWA) and the South Carolina Section of American Water Works Association (SCAWWA). Since 1994 I have been employed by HPG and Company, Consulting Engineers. My present position is President of the firm with responsibilities including the engineering design and management of all firm projects. From 1980 to 1994, I was employed as an engineer for B.P. Barber and Associates, Inc. From 1979 to 1980, I was employed as an engineer for Wilbur Smith & Associates. From 1978 to 1979, I was employed by the South Carolina Department of Health and Environmental Control. I am Vice-President of Midlands Utility, Inc.

Q. What is the principal business of HPG and Company?

A. We engineer, design and manage water and wastewater treatment, water distribution, pumping and storage, wastewater collection, pump stations and force main projects for our clients. Our clients included municipalities and counties such as the

Town of Allendale, Beaufort Jasper Water and Sewer Authority, Calhoun County, Town of Eastover, Town of Fairfax, and the Greenwood Commission of Public Works.

Q. What is the purpose of your rebuttal testimony in this proceeding?

A. My brother Keith Parnell and I are owners of Midlands Utility, Inc. (Midlands), Development Service, Inc. (DSI) and Bush River Utilities (Bush River). In addition, Keith and I provide the engineering expertise for our companies and where necessary, we rely on the full range of expertise of HPG and Company. Previously I provided rebuttal testimony in connection with Bush River Utilities' application for rate increase, Docket No. 2004-259-S. There exist certain matters in the ORS testimony of Mr. Willie J. Morgan that must be addressed.

Q. Mr. Parnell, what improvements to Midlands' wastewater treatment facilities is DHEC requiring which Mr. Morgan takes issue with in his testimony?

A. Currently, consent orders with DHEC require Midlands to upgrade its Windy Hill, Raintree Acres and Bellemeade wastewater treatment facilities. After careful analysis, we have determined that upgrading these three facilities by constructing sequencing batch reactors or SBRs as replacement plants will best enable Midlands to meet all DHEC operating and discharge requirements. These SBRs will be similar in design to that to be constructed by Bush River as its replacement plant.

Q. Why do you recommend Sequencing Batch Reactors as replacement plants for your wastewater treatment facilities?

A. The sequencing batch reactor produces a high quality effluent and has a lower capital cost compared to other conventional and equally efficient activated sludge processes. An SBR uses a single basin for mix reaction and clarification of the

wastewater. In addition, its forgiving operation and maintenance requirements simplify its use and repairs. The SBR reacts well to flow variations and organic loading. Last and importantly, the SBR will be capable of meeting the current and anticipated future nutrient limits which DHEC will impose on our discharges. An SBR provides excellent biological removal of nutrients within its basins thus avoiding costly physical and chemical processes. An SBR provides for operational flexibility.

Q. What will the three replacement plants cost to construct?

A. The replacement plant for Windy Hill will cost $571,000. Please see a copy of the Preliminary Engineering Report attached hereto as **Exhibit 1** demonstrating the total project cost for the Windy Hill replacement plant. Please note that the total construction cost of the replacement plant will be $491,000. Included in the total cost of $571,000 are engineering fees which Keith and I are prepared to absorb and contingencies which we do not anticipate at this time. The replacement plant for Raintree Acres will cost $571,000. Please see a copy of the Preliminary Engineering Report attached hereto as **Exhibit 2** demonstrating the total project cost for the Raintree Acres replacement plant. Again, please note that the total construction cost of the replacement plant will be $491,000. Included in the total cost of $571,000 are engineering fees which Keith and I are prepared to absorb and contingencies which we do not anticipate at this time. Last, the replacement plant for Bellemeade will cost $505,000. Please see a copy of the Preliminary Engineering Report attached hereto as **Exhibit 3** demonstrating the total project cost for the Bellemeade replacement plant. Please note that the total construction cost of the replacement plant will be $425,000. Included in the total cost of $505,000 are

engineering fees which we are prepared to absorb and contingencies which we do not anticipate at this time.

Q. Why is a 20 year depreciation schedule appropriate for the wastewater treatment plants?

A. Equipment should have a useful life of no more than 20 years. Although a facility may have a structure which could last for 32 years, there is no reason to believe that in a wastewater treatment process, the equipment itself could last for 32 years. The reasons for this are two fold. First, the equipment requires severe duty and has to perform in a harsh environment. Second, discharge limits are expected to become more stringent. As a result, the equipment may not effectively treat to these lower levels requiring the purchase and construction of new equipment before the original equipment can be fully depreciated. In today's ever-changing regulatory atmosphere, anything greater than 20 years is at best speculative. DHEC does not issue permits which exceed five years and many issues relating to financing necessitate shorter depreciation time frames. My opinion in this regard is based upon my education, training and experience and supported by references such as The WEF Manual of Practice, *Design of Municipal Wastewater Treatment Plants, Volume I.* Suppliers of treatment plant equipment also support this position as seen by correspondence from Mr. Jim Stanton, Interstate Utility Sales, Inc. dated January 19, 2005; and correspondence of Anthony R. Combs, PE, President, Combs & Associates, Inc., dated January 19, 2005. Please see **Exhibit 4** attached indicating specific life cycle information pertinent to depreciation.

Q. Mr. Morgan of the ORS staff has substantial differences with Midlands' business judgment to upgrade the wastewater treatment plants with SBRs. Please comment?

A. We are adamant that the SBR technology for each of the wastewater treatment plants will remedy most efficiently and operationally the National Pollutant Discharge Elimination System (NPDES) requirements.

Q. Mr. Parnell, would you please respond to the comments in Mr. Morgan's testimony concerning Midlands' overall facilities?

A. It is old news and of course simply reiterates and confirms why we are choosing the SBR technology in order to get beyond existing deficiencies inherent to outdated lagoons.

Q. What response do you have to Mr. Morgan's assertion in his direct testimony concerning disinfection and other implied technical treatment problems?

A. The high quality of treatment provided by a sequencing batch reactor permits the use of Ultraviolet (UV) disinfection. We are fundamentally aware that total suspended solids (TSS) affect UV disinfection efficiency. When used with the highly effective sequencing batch reactor, ultraviolet disinfection will prove efficient. Moreover, the use and handling of chlorine gas is very dangerous as well evidenced by the headlines in today's papers. Given the close proximity of our wastewater treatment plants to residential subdivisions, our decision to employ the safer use of ultraviolet disinfection is totally appropriate and lessens substantially the liability from chlorine accidents. We will not consider the use of chlorine gas.

Q. Mr. Morgan suggests that cost savings could be obtained by using an open bidding process. Do you agree?

A. His assertion is simply not fitting to the facts. During the course of our engineering these projects, we did solicit competing price quotes for equipment and structures from various suppliers and contractors. We selected the most cost effective. We are prepared to continue to provide our engineering services and intend to perform some of the construction work ourselves. Steel tankage, foundations and electrical are some of the trades we will be subcontracting. For example, the total construction cost for the Windy Hill replacement plant is $491,000. By Midlands performing certain of the construction work, we would hope to reduce this cost further. Comparatively, prime contractors also subcontract trades and project work. Contractors add overhead and profit on all costs including equipment purchases and normally add overhead and profit to the subcontractor's cost. This does not even address a prime contractor's cost for insurance, bonding, mobilization, and other incidental cost. Given our own abilities and expertise to manage and carry out the necessary project, it would be unreasonable for our small private companies to be required to bid our projects and purchases. Because a prime contractor's bid to construct the upgrade would of necessity be more expensive than our cost, we would be asking for higher rates in reality if Mr. Morgan's suggestions were required. All public and private utilities that have the capability to perform work with their own forces do so.

Q. Mr. Parnell, does this complete your rebuttal testimony?

A. Yes.

EXHIBIT 1

Windy Hill PER

Wastewater Construction Permit
Bureau of Water

RECEIVED
JAN 28 2005
BY:

D H E C
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

Permission is hereby granted to: Midlands Utility Inc
816 East Main St
Lexington, SC 29072

for the construction of an upgrade to an existing wastewater treatment plant in accordance with the construction plans, specifications, engineering report and the Construction Permit Application signed by Charles K. Parnell, Registered Professional Engineer, S.C. Registration Number: 9406.

Project Name: WINDY HILL REPLACEMENT PLANT **County:** Lexington
Location: Old Two Notch & Muddy Springs Rd

Project Description: Consists of replacing existing 2-lagoon plant with a packaged SBR plant: demolition of existing two chlorination units and the smaller lagoon and addition of a bar screen, influent pmp station & force main, on-slab SBR plant w/ UV disinfection & weir box / sample station, effluent pipe run as well as all associated regrading, structures, electricals, controls and other appurtenances shown in the approved plans are included.

The effluent will be discharged to the DEDICATED SPRAY SITE at a design flow rate of 42000 gallons per day.

The effluent concentrations of those constituents the wastewater treatment system is designed to remove or reduce are contained in ND Permit ND0067075. Treatment Plant Classification: II-B

Special Conditions:

The smaller pond shall be closed out in accordance with SC Regulation R.61-82 under a separate approval issued by the Bureau of Water and the closout shall be approved by the EQC District Office prior to constructing these upgrades.

Weir box & sampling station shall be easily accessible and their construction and access shall be such as NOT to be construable as a confined space.

A satisfctory O&M Manual shall be required for operational approval issuance.

In accepting this permit, the owner agrees to the admission of properly authorized persons at all reasonable hours for the purpose of sampling and inspection.

This is a permit for construction only and does not constitute State Department of Health and Environmental Control approval, temporary or otherwise, to place the system in operation. An Approval to Place in Operation is required and can be obtained following the completion of construction by contacting the EQC Central Midlands District Office at (803) 896-0620. Additional permits may be required prior to construction (e.g., stormwater).

Permit Number: 30,693-WW
Date of Issue: January 25, 2005
Expiration Date: Construction must begin prior to January 26, 2007 and be completed prior to January 25, 2008, or this permit will expire.

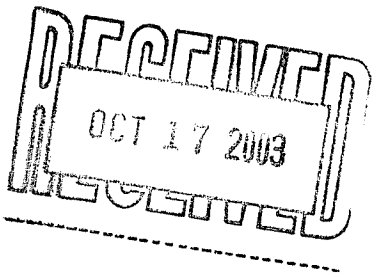
Jeffrey P. deBessonet, P.E., Director
Water Facilities Permitting Division

MK

D H E C
PROMOTE PROTECT PROSPER

2600 Bull Street
Columbia, SC 29201-1708

October 14, 2003



Mr. Charles K. Parnell, P.E.
HPG and Company
1432 Sunset Blvd.
West Columbia, SC 29169

Re: Preliminary Engineering Report (PER) Approval
Windy Hill Subdivision
No Discharge Permit # ND0067075
Lexington County

Dear Mr. Parnell:

The Preliminary Engineering Report dated June 2003, for the Windy Hill Subdivision wastewater treatment plant upgrade is approved.

This Preliminary Engineering Report (PER) approval is valid for a period up to six (6) months from the above date. Plans and Specifications consistent with the approved PER must be submitted during this period. Approval of the PER does not guarantee that a SCDHEC Construction Permit will be issued for the project.

This approval does not affect, modify, or extend any existing Schedule of Compliance or Enforcement Schedule, which may be in effect. This Agency reserves the right to re-evaluate and/or require modifications to any approved PER after this six (6) month period.

Please note that the applicant must comply with the provisions of R61-9.600 (Viability Requirements) that require entities owning wastewater systems to demonstrate the technical, managerial and financial means to comply with the regulations as a prerequisite for receiving a wastewater discharge permit (ND). As part of the permitting process, the permittee must provide sufficient information (as described in R61-9.600) to document compliance with this condition.

If you have any questions, please do not hesitate to write or call Brenda Anderson of my staff at 803/898-3375.

Sincerely,

Michael Montebello, Manager
Domestic Wastewater Permitting Section
Water Facilities Permitting Division

bla:
cc: Midlands Utility, Inc.
Anastasia Hunter-Shaw, Enforcement
Central Midlands EQC District Office

PRELIMINARY ENGINEERING REPORT

MIDLANDS UTILITY, INC.

WINDY HILL SUBDIVISION

WASTEWATER TREATMENT PLANT REPLACEMENT

Prepared for:
Midlands Utility, Inc.
816 East Main Street
Lexington, South Carolina 29072

PRELIMINARY ENGINEERING REPORT

MIDLANDS UTILITY, INC.

WINDY HILL SUBDIVISION

WASTEWATER TREATMENT PLANT REPLACEMENT

Prepared for:
Midlands Utility, Inc.
816 East Main Street
Lexington, South Carolina 29072

Prepared by:
HPG and Company, Consulting Engineers, Inc.
1432 Sunset Boulevard
West Columbia, South Carolina 29169

June, 2003

TABLE OF CONTENTS

I INTRODUCTION

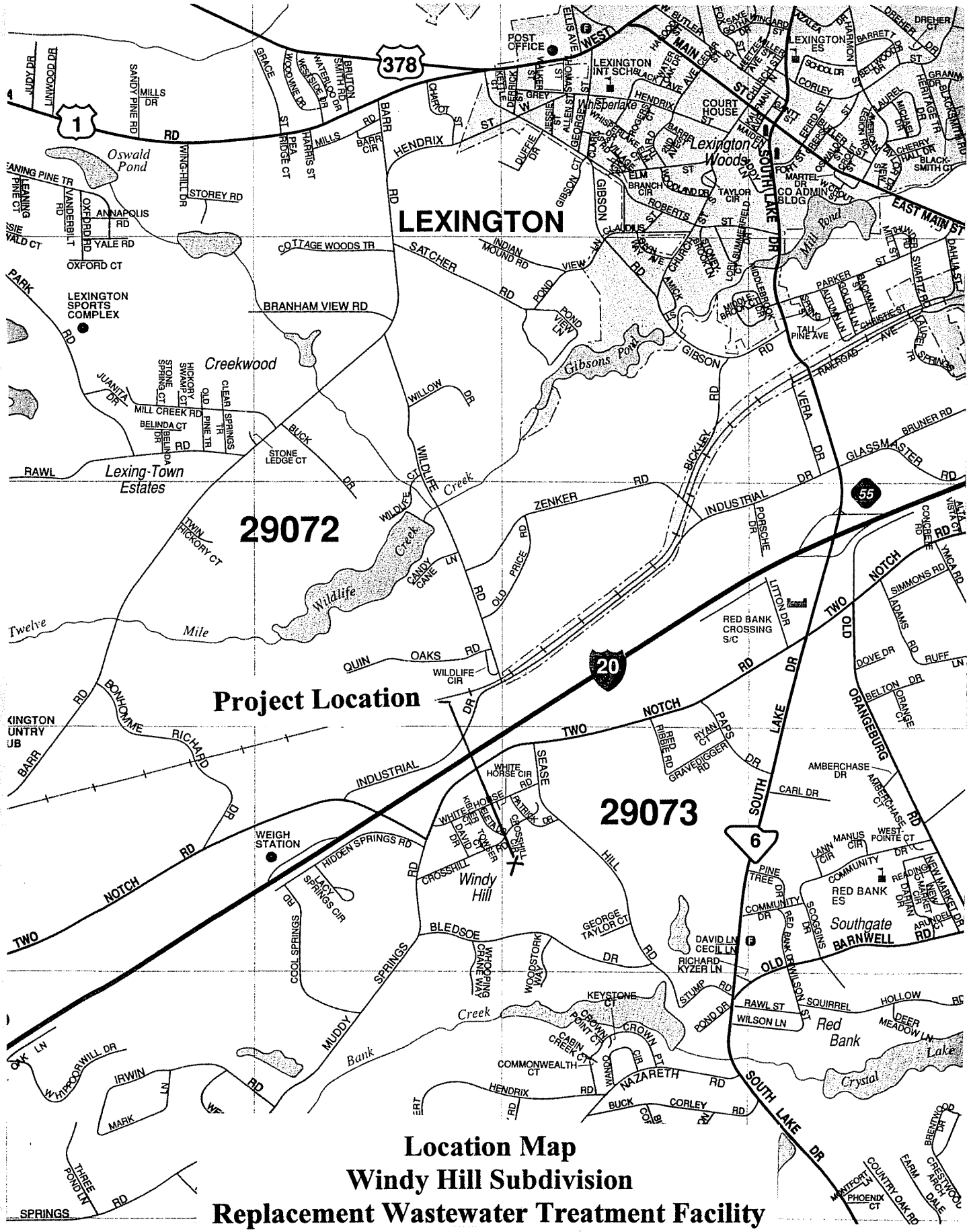
A. GENERAL INFORMATION

Midlands Utility is a privately owned, public utility which owns, operates and maintains a number of wastewater collection and treatment facilities within Richland and Lexington Counties. One of these facilities serves a subdivision near the town of Lexington, at I-20and Old Two Notch Road. This subdivision is known as the Windy Hill Subdivision. This particular collection and treatment system provides wastewater service for approximately 160 residences. A location map is provided in Figure I-1 showing the location of this particular facility.

The various contacts for this project are as follows:

Owner: Midlands Utility, Inc.
816 East Main Street
Lexington, South Carolina 29072
Contacts: Keith G. Parnell, P.E., President
Telephone: (803) 359-4803
Facsimile: (803) 359-2374

Engineer: HPG and Company, Consulting Engineers, Inc.
1432 Sunset Boulevard
West Columbia, South Carolina 29169
Contacts: Charles K. Parnell, P.E.
Telephone: (803) 739-2888
Facsimile: (803) 739-2277



Location Map
Windy Hill Subdivision
Replacement Wastewater Treatment Facility

Scale : 1"=2500'(+/-)

B. PROJECT NEED / DESCRIPTION

The existing facility consist of an aerated lagoon and polishing pond. Final effluent disposal is by land application, spray irrigation and drain field of approximately seven (7) acres. The spray site is immediately adjacent to the plant site. The customer base is exclusively domestic. There are no industrial or commercial discharges to the system.

Although this facility is reasonable reliable, some NPDES parameters are exceeded from time to time. A modernization of the facility is needed. Proposed by this Preliminary Engineering Report is the construction of a new, advanced wastewater treatment facility. Once complete, the primary aerated lagoon portion of the facility will be closed-out. The polishing / holding pond will remain to store treated effluent prior to spray irrigation. Proposed is a new sequencing batch reactor process (SBR) with diffused, fine bubble aeration. Also proposed is a new headworks facility and post treatment disinfection. The headworks will include mechanical screening, post disinfection will utilize UV.

II EXISTING FACILITY EVALUATION

A. NPDES PERMIT

Midlands Utility does currently have an active NPDES permit for this facility ND0067075. The limits of this permit are listed in the following Table II.1.

TABLE II.I
NPDES PERMIT LIMITS

Parameter	*Concentration*
Dissolved Oxygen	2.0 min., instantaneous
BOD_5	30 mg/l monthly average 45 mg/l weekly average
pH	6.0 - 8.5 std. Units
Total Suspended Solids	90 mg/l monthly average 135 mg/l weekly average
Flow	0.042 MGD
Fecal Coliform	200 # per 100 ml - average 400 # per 100 ml - maximum
Nitrate as N	Monitor and report

B. HISTORICAL PERFORMANCE OF FACILITY

Midlands Utility, through their laboratory, samples and tests for the parameters shown in Table II.1. The following, Table II.2 shows discharge parameter data for the past twelve months as shown on the discharge monitoring reports (DMR).

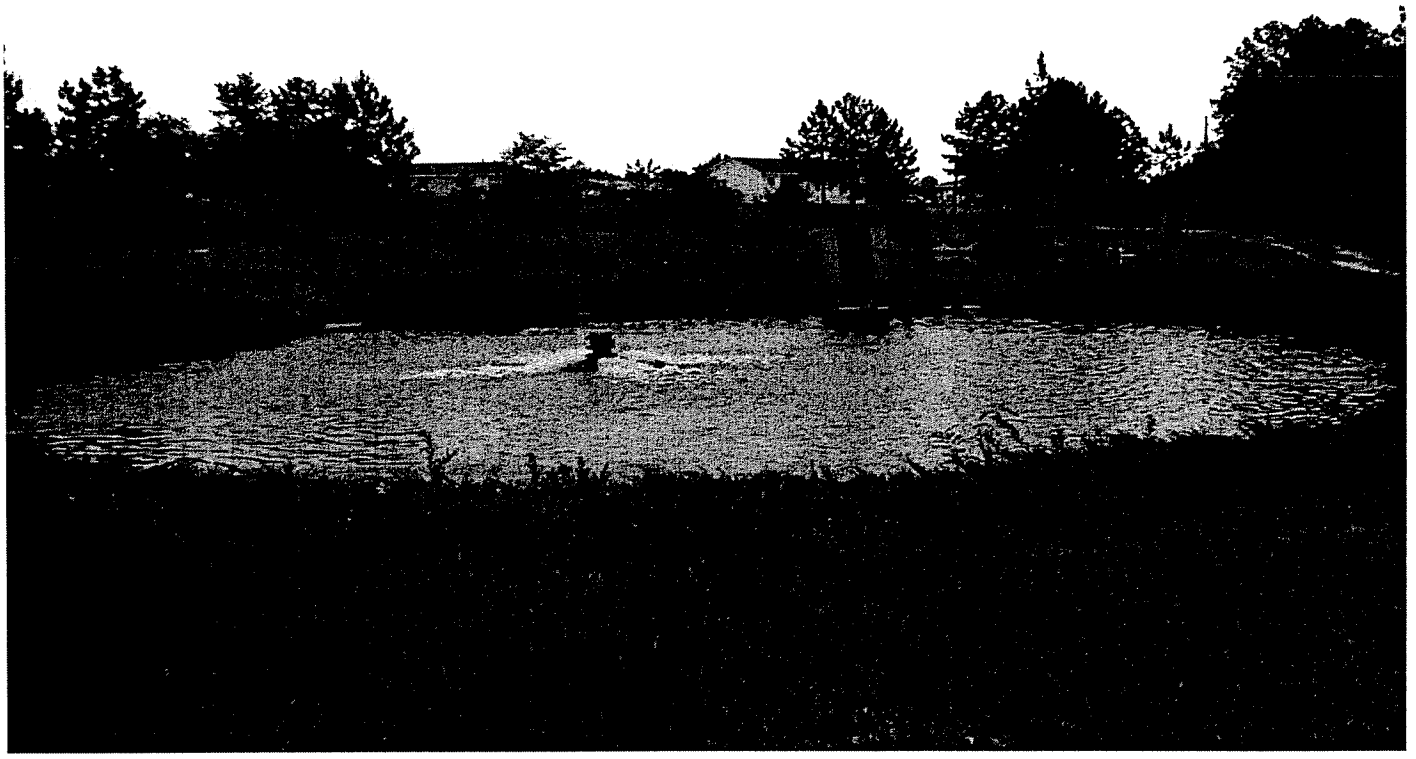
TABLE II.2
LABORATORY DATA

Month	*DO*	*BOD*	*pH*	*TSS*	*Nitrate as N*	*Flow in Conduit*	*Fecal*
April, 2003	2.7	32	6.2 - 8.3	17	7.7	0.016	<4
March, 2003	2.6	22	6.1 - 8.4	23	12.4	0.015	<4
February, 2003	6.1	16	7.2 - 8.4	47	0.5	0.015	<10
January, 2003	6.0	46	7.0 - 8.4	30	0.3	0.007	<4
December, 2002	5.2	18	6.7 - 7.6	13	0.9	0.008	<10
November, 2002	2.3	28	6.2 - 7.3	24	0.9	0.029	<4
October, 2002	2.2	32	6.1 - 8.0	21	0.5	0.024	<2
September, 2002	2.2	21	6.2 - 7.2	26	0.1	0.017	<4
August, 2002	2.1	28	6.1 - 7.8	31	1.1	0.020	<2
July, 2002	2.2	38	6.3 - 8.4	31	1.1	0.011	<2
June, 2002	2.3	26	6.1 - 8.5	18	1.2	0.010	2
May, 2002	3.2	6	7.1 - 8.0	19	2.2	0.010	<2
April, 2002	3.2	6	6.2 - 8.2	15	5.9	0.012	2

pH expressed in standard units.
Fecal is expressed in # per 100 ml.
All other units expressed as milligrams per liter.
Flow expressed in million gallons per day

C. LAGOON SYSTEM

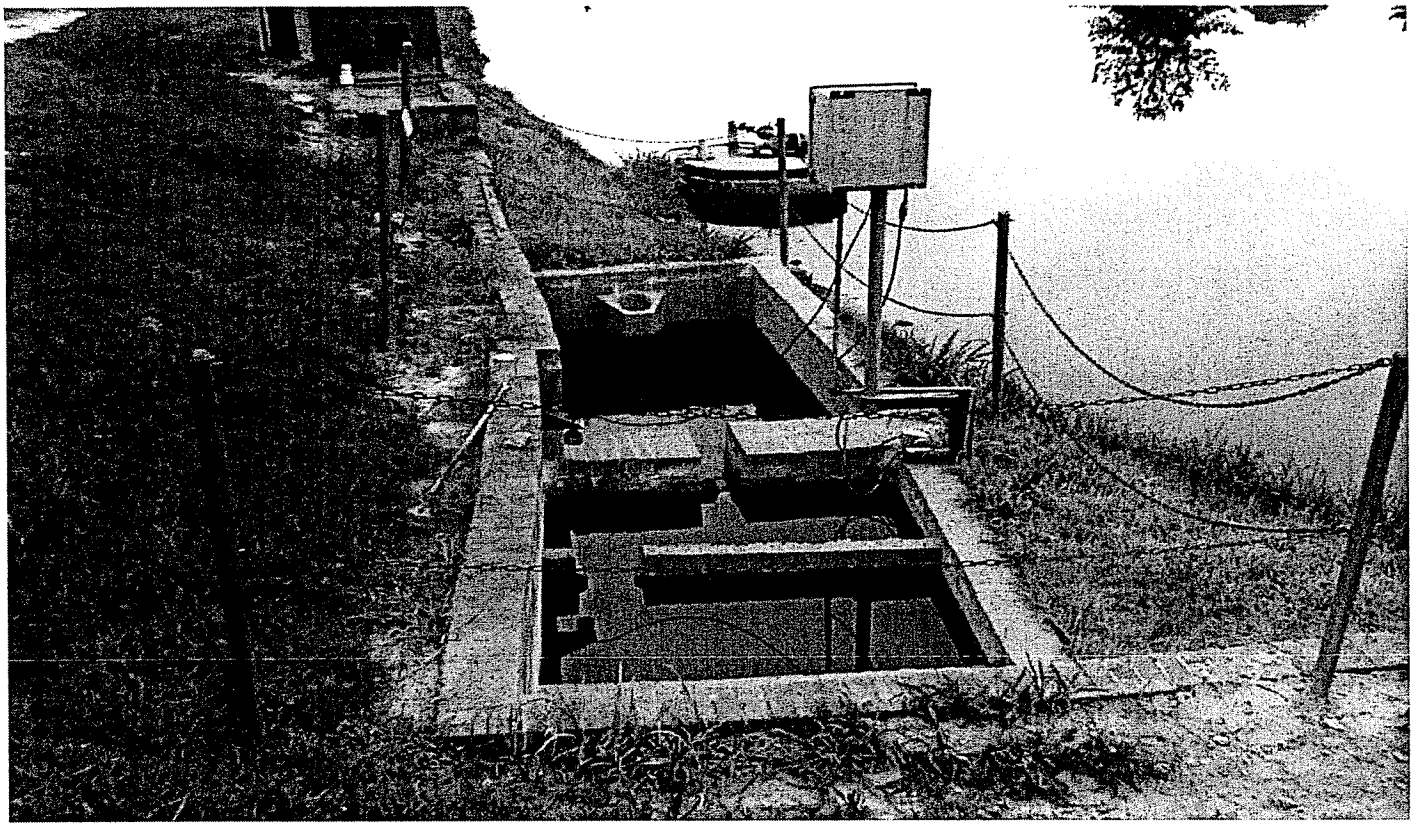
The treatment facility is comprised of a single aerated lagoon (photograph c.1) with one five hp surface aerator. Flow enters the lagoon from the left corner of the basin (photograph) and exits the opposite corner. Flow travels from the aerated lagoon to a polishing pond shown in the background of photograph C.1. The building and chlorine contact chamber between the two ponds shown in photograph C.1 is abandoned.



Photograph C.I

Photograph C.2

Shown in this photograph is the effluent storage basin. The basin provides holding prior to land application. Flow enters the basin from the left of the photograph and exits through the effluent metering station and chlorine contact chamber. An effluent pump station delivers effluent for land application. The entire site is fenced for security.



Photograph C.3

Shown in this photograph is the effluent holding pond in the background. Flow exits the pond through the chlorine contact chamber and effluent pump station. The building in the background is the chlorine building which houses the feed equipment. The concrete structure is the chlorine contact chamber and effluent pump station.

D. EFFLUENT DISCHARGE - LAND APPLICATION

Photograph D.1

Shown in this photograph is a portion of the land application lands for final disposal. The land application disposal will remain after improvements are made.

III RECOMMENDED FACILITY IMPROVEMENTS

A. GENERAL

As stated in Section I of this Preliminary Engineering Report, the replacement plant is proposed to be a sequencing batch reactor (SBR) designed at not less than 42,000 gpd and capable of treatment levels of 10/10/1 (BOD_5 / TSS / pH_3 - N). This process is far superior to that of the existing lagoon system. The existing NPDES permit discharge limits stated in Section II of this report are assumed to apply to the new facility. No changes are anticipated at this time.

B. PROPOSED PLANT CONFIGURATION

The new plant will consist of the following units of operations:

- Mechanical screening
- Manual standby screening
- Dual train sequencing batch reactor basins
- Diffused aeration
- Controls
- Post SBR equalization and aeration with controlled peak rate discharge
- Post Dual UV disinfection
- Post, flow monitoring
- Holding (existing basin)
- Spray irrigation (existing)

C. INFLUENT WASTEWATER CHARACTERISTICS

The waste stream to this facility is typical domestic, generated by exclusively residential homes. The wastewater delivered to this facility is believed to have the following generalized characteristics:

Table IV.I
Influent Wastewater Characteristics

Average dry weather flow	60,000 gpd
Peak dry weather flow	135,000 gpd
Peak wet weather flow	180,000 gpd
BOD_5 (20° C)	250 mg/l
BOD_5 (20° C)	125 lbs/ day
Suspended solids	200 mg/l
NH_3 - N	25 mg/l
Alkalinity	150 mg/l
Wastewater temperature	20° C
Ambient air temperature	20 - 90° F
Site elevation	420 ft.

D. DESIGN EFFLUENT QUALITY

Although the current NPDES permit discharge limits can be met with an aerated lagoon system, it is believed remiss not to design an advanced wastewater treatment facility. As a result, the utility will approach the design of this facility which will be capable of producing an effluent exceeding the quality shown in Table II.1 and the following:

Table IV.2
Effluent Quality
(Average Monthly)

BOD_5 (20°c)	< 10 mg/l
Total suspended solids	< 10 mg/l
NH_3 - N	< 1 mg/l

E. PLANT RELIABILITY

This facility will be designed to meet a Class III reliability. The following will be incorporated into the facility design:

- Standby / auxiliary connection (transfer switch) for a generator will be provided.
- Dual SBR trains will be installed.
- One mechanical bar screen will be installed along with a manual cleaned back-up screen.
- All pumps and aeration blowers will be provided in duplicate, each capable of handling the average flow. Not less than 2 units will be provided.
- Each SBR train will have an independent clarification sequence.
- The dual SBR trains will each have a capacity equal to the design capacity of the entire facility.
- Dual disinfection units will be provided each capable of treating the entire facility flow.
- Independent sludge holding will be provided for the facility

F. SBR DESIGN CRITERIA

The sequencing batch reactor process is chosen as the proposed method to provide a high level of treatment prior to land application. The SBR will be provided with two independent treatment trains, each capable of handling the entire plant design flow. The process is separated into the following treatment components:

- Influent screening
- Influent pumping
- SBR zone with diffused aeration
- Decanter
- Dual ultraviolet light disinfection
- Effluent metering
- Land application (existing)

Table IV.3
SBR General Design Influent Criteria

Average daily flow	60,000 gpd
Peak dry weather flow / average flow ratio	2.25
Peak wet weather flow / average flow ratio	3.0
BOD (mg/l)	250
TSS (mg/l)	250
NH_3 - N (mg/l)	40
Wastewater temperature	20° C
Ambient air temperature	20 - 90° C
Site elevation	420' MSL

Table IV.4
Effluent Design quality

BOD_5 (20° C)	10 / mg/l
TSS	10 / mg/l
NH_3 - N	1 mg/l

Table IV.5
SBR Process Design

F / M Ratio	0.06 lb BOD / lb MLSS / day
SVI (after 30 min. settle time)	150 mg / l
MLSS (at low water level)	5174 mg / l
Waste sludge produced	90 lbs / day
Volume sludge produced (0.85% solids)	1,271 GPD
Normal decant rate	188 gpm
Peak decant rate	250 gpm (wet weather flow)
Hydraulic retention time	0.93 days
Sludge age	21.95 days

Table IV.6
SBR Cycle / Design

Number of tanks	2
Number of decanters per tank	1
Max water level	18 ft.
Operating range	4.7 ft.
Total tankage volume (@ HWL)	32,720 gallons - each train 65,440 gallons - total
Total HRT	35 hours
Cycles per tank per day (normal)	6
Total cycle time	240 minutes
Aeration time	120 minutes
Settle time	60 minutes
Decant time	60 minutes
Decant rate	188 gpm
Blower horsepower per tank	30 bhp

G. SLUDGE HANDLING

A separate sludge holding tank will be provided on-site into which to waste sludge. The facilities to thicken and decant will also be provided to reduce sludge volume. Periodically (based on operation), sludge will be pumped from the holding basin and trucked off-site to an approved disposal site.

H. COST ESTIMATE

The new plant will be constructed on the existing plant site. The estimated cost for this work is itemized in the following table.

Table IV.8
SBR Plant Construction

Item	*Description*	*Cost*
1.	Influent pump station	$50,000.00
2.	New bar screen, structure and equipment	25,000.00
3.	SBR equipment	131,000.00
4.	SBR equipment installation	10,000.00
5.	Tankage	65,000.00
6.	Concrete foundation	75,000.00
7.	Electrical	20,000.00
8.	Piping	15,000.00
9.	Sludge holding	75,000.00
10.	UV Disinfection equipment and installation	25,000.00
	Total Construction	$491,000.00
	Engineering	40,000.00
	Contingencies	40,000.00
	Total Project Cost	$571,000.00

I. IMPLEMENTATION SCHEDULE

To construct the new facility, the following schedule is proposed. This schedule is obviously contingent on the review and approval periods. The actual on-line date will be affected by these.

Submit Preliminary Engineering Report	June 6, 2003
Approve Preliminary Engineering Report	July 15, 2003
Submit Construction Drawings	October, 2003
Approve Construction Drawings	November 15, 2003
Begin Construction	February 15, 2004
End Construction	August 15, 2004
Place System in Operation (final SCDHEC approval)	August 15, 2004

APPENDIX A

SCDHEC CONSENT ORDER

THE STATE OF SOUTH CAROLINA
BEFORE THE DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

IN RE: MIDLANDS UTILITIES, INC.
WINDY HILL SUBDIVISION
LEXINGTON COUNTY

CONSENT ORDER
03- 048 -W

Midlands Utilities, Inc. (Respondent) owns and is responsible for the proper operation and maintenance of a wastewater treatment facility (WWTF) serving Windy Hill Subdivision located in Lexington County, South Carolina.

A review of the Respondent's file by the South Carolina Department of Health and Environmental Control (Department) revealed that the Respondent violated the Pollution Control Act, S.C. Code Ann. §§ 48-1-10 et seq. (1987 & Supp. 2002) and Land Application Discharge Permit ND0067075 in that it exceeded the permitted discharge limits for biochemical oxygen demand (BOD) as specified in Part I.A.1 of the permit.

In accordance with approved procedures and based upon discussions with the Respondent on March 27, 2003, the parties have agreed to the issuance of this Order to include the following Findings of Fact and Conclusions of Law.

In the interest of resolving this matter without delay and expense of litigation the Respondent agrees to the entry of this Consent Order, but neither agrees nor disagrees with the Findings of Fact or the Conclusions of Law; and therefore, agrees that this Order shall be deemed an admission of fact and law only as necessary for enforcement of this Order by the Department or subsequent actions relating to the Respondent by the Department.

FINDINGS OF FACT

1. Department staff issued Land Application Discharge Permit ND0067075, allowing the Respondent to discharge treated wastewater to a spray field and/or tile field located behind the WWTF in accordance with the effluent limitations, monitoring requirements and other conditions set forth therein.

2. The Respondent reported violations of the permitted discharge limits for BOD on discharge monitoring reports submitted to the Department for the March, July and October 2002 and January 2003 monitoring periods.

3. The regional sewer system owned by the Lexington County Joint Municipal Water & Sewer Commission is not available to the Respondent for connection due to a lack of treatment capacity in its system at this time.

CONCLUSIONS OF LAW

Based upon the above Findings of Fact, the Department reaches the following Conclusions of Law:

1. The Respondent violated the Pollution Control Act, S.C. Code Ann.§ 48-1-110 (d) (Supp. 2002), and Water Pollution Control Permits, 24 S.C. Code Ann. Regs. 61-9.505.41(a)(2) (Supp. 2002), in that it failed to comply with the permitted discharge limits for BOD as specified in Part I.A.1 of the permit.

2. The Pollution Control Act, S.C. Code Ann. § 48-1-330 (1987), provides for a civil penalty not to exceed ten thousand dollars ($10,000.00) per day of violation for any person violating the Act or any rule, regulation, permit, permit condition, final determination, or Order of the Department.

NOW, THEREFORE, IT IS ORDERED, CONSENTED TO AND AGREED, pursuant to the Pollution Control Act, S.C. Code Ann § 48-1-50 (1987) and § 48-1-100 (Supp. 2002), that the

Respondent shall:

1. Within sixty (60) days of the execution date of this Order, submit to the Department a Preliminary Engineering Report (PER) addressing upgrade of the WWTF to meet permitted discharge limits.
2. Within sixty (60) days of Department approval of the PER, submit to the Department the plans and specifications and an application for a permit to construct addressing upgrade of the WWTF to meet permitted discharge limits.
3. Within ninety (90) days of issuance of permit to construct, begin construction of the permitted upgrade to the WWTF.
4. Within two hundred forty (240) days of the beginning of construction, complete construction of the upgrade to the WWTF and request final operational approval from the Department.
5. Pay to the Department a civil penalty in the amount of two thousand eight hundred dollars ($2,800.00), payable in quarterly installments over a period of thirty (30) months, together with interest on the outstanding balance calculated at 8.75% per annum, with the first payment due on May 5, 2003. The Respondent may pay the penalty in full at any time.

IT IS FURTHER ORDERED AND AGREED that where the Department has requested information in connection with the above actions, the Respondent shall respond to such requests in a timely fashion.

THEREFORE IT IS FURTHER AGREED that if any event occurs which causes or may cause a delay in meeting any of the above scheduled dates for completion of any specified activity, the Respondent shall notify the Department in writing at least one (1) week before the scheduled date, describing in detail the anticipated length of the delay, the precise cause or causes of delay, if ascertainable, the measures taken or to be taken to prevent or minimize the delay, and the timetable

by which those measures will be implemented.

The Department shall provide written notice as soon as practicable that a specified extension of time has been granted or that no extension has been granted. An extension shall be granted for any scheduled activity delayed by an event of *force majeure*, which shall mean any event arising from causes beyond the control of the Respondent that causes a delay in or prevents the performance of any of the conditions under this Consent Order including, but not limited to: a) acts of God, fire, war, insurrection, civil disturbance, explosion; b) adverse weather condition that could not be reasonably anticipated causing unusual delay in transportation and/or field work activities; c) restraint by court order or order of public authority; d) inability to obtain, after exercise of reasonable diligence and timely submittal of all applicable applications, any necessary authorizations, approvals, permits, or licenses due to action or inaction of any governmental agency or authority; and e) delays caused by compliance with applicable statutes or regulations governing contracting, procurement or acquisition procedures, despite the exercise of reasonable diligence by the Respondent.

Events which are not *force majeure* include by example, but are not limited to, unanticipated or increased costs of performance, changed economic circumstances, normal precipitation events, or any person's failure to exercise due diligence in obtaining governmental permits or fulfilling contractual duties. Such determination will be made in the sole discretion of the Department. Any extension shall be incorporated by reference as an enforceable part of this Consent Order and thereafter be referred to as an attachment to the Consent Order.

PURSUANT TO THIS ORDER, all communication regarding this Order and its requirements shall be addressed as follows:

Anastasia Hunter-Shaw
Water Enforcement Division

Bureau of Water
SCDHEC
2600 Bull Street
Columbia, S.C. 29201

IT IS FURTHER ORDERED AND AGREED that failure to comply with any provision of this Order shall be grounds for further enforcement action pursuant to the Pollution Control Act, S.C. Code Ann.§ 48-1-330 (1987), to include the assessment of additional civil penalties.

THE SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

R. Lewis Shaw, P.E.,
Deputy Commissioner for EQC

DATE: 4/7/03

Alton C. Boozer, Chief
Bureau of Water

DATE: 7 April, 2003

WE CONSENT:

Midlands Utilities, Inc.

DATE: 4/4/03

Attorney for the Department

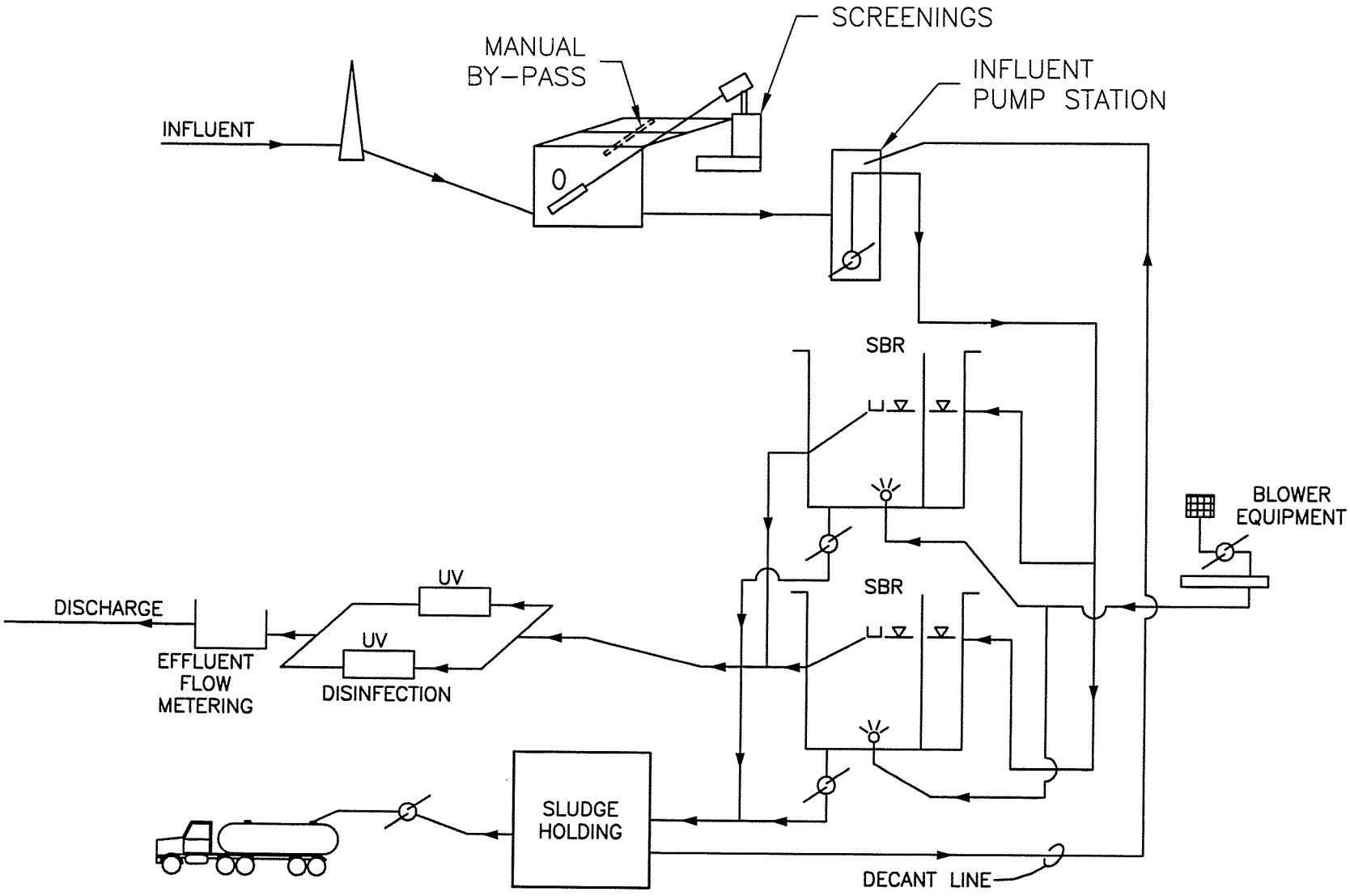
DATE: 4/4/03

Valerie A. Betterton, Director
Water Enforcement Division

DATE: 4/7/03

APPENDIX B

NEW SBR PROCESS SCHEMATIC



PLANT FLOW SCHEMATIC
WINDY HILL WASTEWATER TREATMENT FACILITY

NOT TO SCALE

MIDLANDS UTILITY		
WASTEWATER TREATMENT PLANT FACILITY UPGRADES		
APPROVED BY: CKP	DATE: 060103	DRAWING NO: 00005
SCALE: AS SHOWN	REVISED:	

APPENDIX C

CONCEPTUAL SITE PLAN FOR NEW SBR PLANT

EXHIBIT 2

Raintree Acres PER

D H E C

PROMOTE PROTECT PROSPER

February 3, 2005

Charles K. Parnell, P.E.
HPG and Company Consultants
1432 Sunset Boulevard
W. Columbia SC 29169

RE: Raintree Acres / Dutch Village WWTP upgrade to SBR; HPG Job #02055
Permit #SC0039055, Richland County

Dear Mr. Parnell:

The Preliminary Engineering Report dated June 2004 and last revised January 28, 2005 for the referenced wastewater treatment plant upgrade is hereby approved.

This Preliminary Engineering Report (PER) approval is valid for a period up to six (6) months from the above date. Plans and Specifications consistent with the approved PER must be submitted during this period. Approval of the PER does **not** (a) guarantee that a SCDHEC Construction Permit will be issued for the project and (b) extend to include closeout of the associated treatment pond(s).

This approval does not affect, modify, or extend any existing Schedule of Compliance or Enforcement Schedule, which may be in effect. This Agency reserves the right to re-evaluate and/or require modifications to any approved PER after this six (6) month period.

When issued, the construction permit will include a special condition that addition of a separate waste sludge storage unit may be required at a later date as deemed necessary by the Department. This is necessitated by the fact that accumulation of fresh and stale sludge in the primary clarifier may lead to operational and/or other problems.

Please write or call Mr. Murali Koppa of my staff at 803/898-4220 with any related questions.

Sincerely,

Michael Montebello, Manager
Domestic Wastewater Permitting Section
Water Facilities Permitting Division

MJM:

cc: Robin Foy, Enforcement
CM EQC District Office
Jeff deBessonet, DHEC
Murali Koppa, DHEC

5. Effluent flow metering is discussed within section III. F, the process schematic and site plan. We propose to use a v-notch weir and level transmitter. The exact method will be detailed in the construction drawings. We anticipate a decant device and/or a flow splitter will be required for utilizing the lagoon as flow equalization. This device will be detailed with construction drawings. The primary clarifier/sludge holding basin is covered. We don't understand a need or comment for a separate sludge holding tank. The sludge holding basin integral to the plant will be sufficient and is appropriate for this facility. All sludge will be trucked off site for final disposal. The integral sludge holding basin has a 60 day capacity at design flow. This does not require that sludge will be maintained for 60 days. There has to be sludge storage on site. Sludge management (hauling) has to be part of the plant operations and will be so coordinated.

With these responses, we request your approval of the PER, and should you have any questions, please do not hesitate to call me.

Sincerely,
HPG AND COMPANY, CONSULTING ENGINEERS, INC.

Charles K. Parnell, P.E.

Enclosures

APPROVED - SCDHEC
WATER FACILITIES PERMITTING DIVISION
PERMIT NO. — DATE FEB 03 2005
BY Michael Montebello
PROJECT ENGR. M. Koppa

FLUIDYNE CORPORATION

2816 West First Street
Cedar Falls, Iowa 50613
Phone: (319) 266-9967
Fax: (319) 277-6034

Reply to: 2202 Gold Oak Lane
Sarasota, Florida 34232
Phone: (941) 342-8915
Fax: (941) 342-9765

ISAM™ SBR with Aspirating Jet Aeration System

Design Calculations For

Midland Utilities - Raintree WWTP

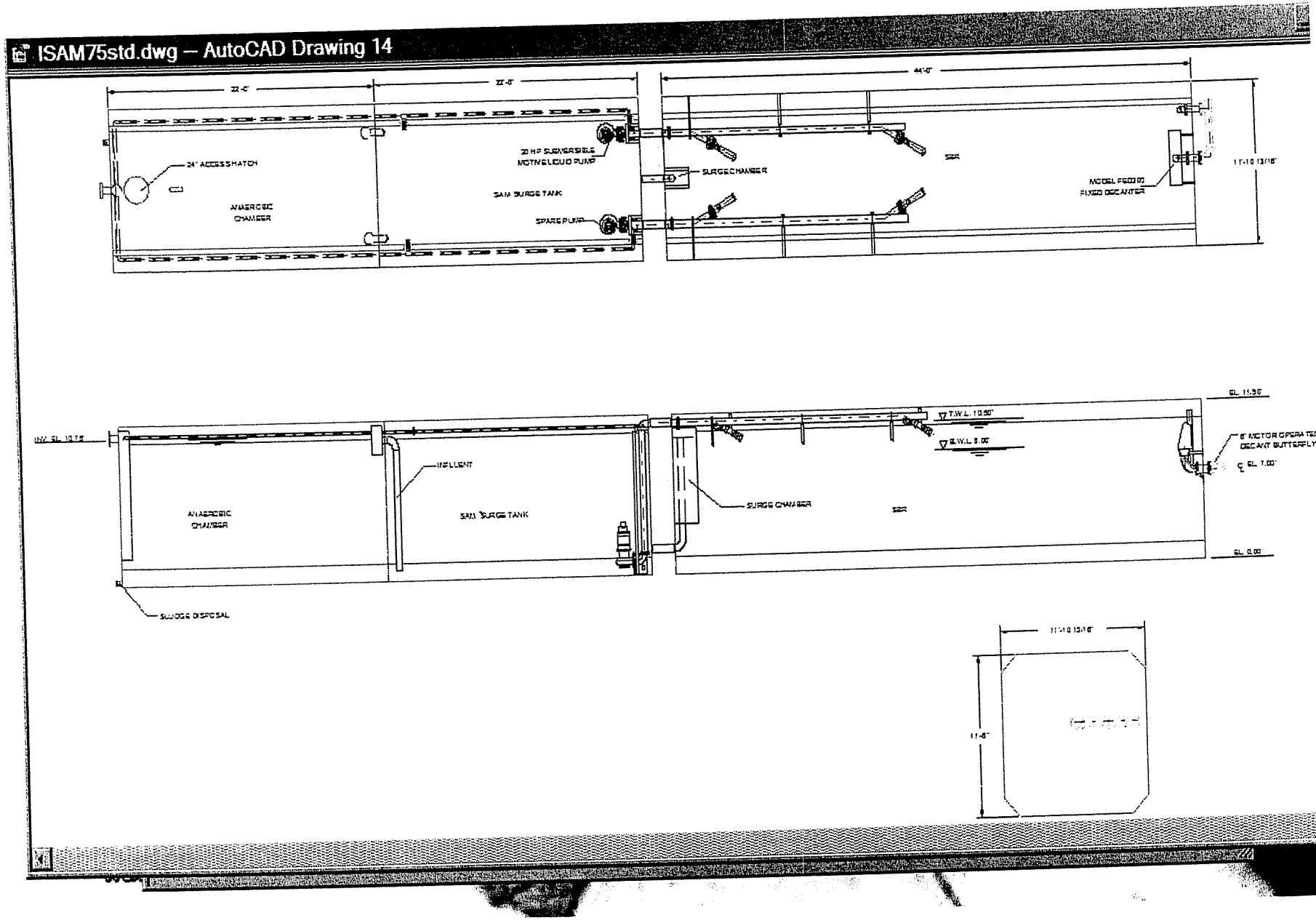
Jan. 28, 2005

I. DESIGN CONDITIONS:

Design flow	=	0.150 MGD → 104.2 GPM
Peak daily flow	=	0.375 MGD (Assumed)
Peak hourly flow	=	313 GPM (Assumed)
Influent BOD_5	=	220 mg/l
	=	275 lbs./day @ design flow
Effluent BOD_5	=	10 mg/l
Influent TSS	=	220 mg/l
Removal in anaerobic chamber	=	65%
TSS to SBR	=	77 mg/l
Effluent TSS	=	10 mg/l
Influent TKN	=	40 mg/l
	=	50 lbs./day
Effluent NH_3-N	=	2 mg/l
Effluent total N	=	10 mg/l
Design MLSS (Full reactor)	=	3,000 mg/l
Design F:M	=	0.09
SRT (SBR)	=	15 days
SRT (SBR plus SAM))	=	23 days
Elevation	=	200 ft. MSL (Assumed)
Average barometric pressure	=	14.58 psia

II. BASIN DESIGN:

SBR basin	=	2
Length	=	44 ft. 0 in.
Width	=	11 ft. 10 in.
TWL	=	10 ft. 6 in.
BWL	=	8 ft. 0 in.
Volume	=	81,786 Gallons
Retention time	=	13.1 hrs.


ISAM75std.dwg – AutoCAD Drawing 14
22'-0"
22'-0"
44'-0"
24" ACCESS HATCH
ANAEROBIC CHAMBER
20 HP SUBMERSIBLE MOTIVE LIQUID PUMP
SAM SURGE TANK
SPARE PUMP
SURGE CHAMBER
SBR
MODEL FE2030 FIXED DECANTER
11'-10 13/16"
INV. EL. 10'-6"
INFLUENT
ANAEROBIC CHAMBER
SAM SURGE TANK
SURGE CHAMBER
SBR
T.W.L. 10.50'
S.W.L. 8.00'
EL. 11.50'
6" MOTOR OPERATED DECANT BUTTERFLY
℄ EL. 7.00'
EL. 0.00
SLUDGE DISPOSAL
11'-6"

Source : Wastewater Engineering, 3rd edition
Metcalf & Eddy, INC.

TABLE 10-5
Design parameters for activated-sludge processes

Process modification	Mean cell res. time θ_c, d	F/M, lb BOD_5 applied/ lb MLVSS · d	Volumetric loading, lb BOD_5/ 10^3 ft^3 · d	MLSS, mg/L	V/Q, h	Q_r/Q (Recirculated flow fraction of influent Q)
Conventional plug flow	5–15	0.2–0.4	20–40	1,200–3,000	4–8	0.25–0.75
Complete-mix	5–15	0.2–0.6	50–120	2,500–6,500	3–5	0.25–1.0
Step-feed	5–15	0.2–0.4	40–60	1,500–3,500	3–5	0.25–0.75
Modified aeration	0.2–0.5	1.5–5.0	75–150	200–1,000	1.5–3	0.05–0.25
Contact stabilization	5–15	0.2–0.6	60–75	(1,000–3,000)[a] (4,000–9,000)[b]	(0.5–1.0)[a] (3–6)[b]	0.5–1.50
Extended aeration	20–30	0.05–0.15	10–25	1,500–5,000	18–36	0.5–1.50
High-rate aeration	5–10	0.4–1.5	100–1,000	3,000–6,000	2–4	1.0–5.0
Kraus process	5–15	0.3–0.8	40–100	2,000–3,000	4–8	0.5–1.0
High-purity oxygen	3–10	0.25–1.0	100–200	3,000–8,000	1–3	0.25–0.5
Oxidation ditch	10–30	0.05–0.30	5–30	1,500–5,000	8–36	0.75–1.50
Sequencing batch reactor	N/A	0.05–0.30	5–15	1,500–5,000[d]	12–50	N/A
Deep shaft reactor	NI	0.5–5.0	NI	NI	0.5–5	NI
Single-stage nitrification	8–20	0.10–0.25 (0.02–0.15)[c]	5–20	1,500–3,500	6–15	0.50–1.50
Separate stage nitrification	15–100	0.05–0.20 (0.04–0.15)[c]	3–9	1,500–3,500	3–6	0.50–2.00

[a] Contact unit.

[b] Solids stabilization unit.

[c] TKN/MLVSS.

[d] MLSS varies depending on the portion of the operating cycle.

Note: lb/10^3 ft^3 · d × 0.0160 = kg/m^3 · d
lb/lb · d = kg/kg · d
N/A = not applicable
NI = no information

Solv

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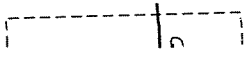

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D H E C

PROMOTE PROTECT PROSPER

February 3, 2005

RECEIVED
FEB 07 2005
BY:

Charles K. Parnell, P.E.
HPG and Company Consultants
1432 Sunset Boulevard
W. Columbia SC 29169

RE: Raintree Acres / Dutch Village WWTP upgrade to SBR; HPG Job #02055
Permit #SC0039055, Richland County

Dear Mr. Parnell:

The Preliminary Engineering Report dated June 2004 and last revised January 28, 2005 for the referenced wastewater treatment plant upgrade is hereby approved.

This Preliminary Engineering Report (PER) approval is valid for a period up to six (6) months from the above date. Plans and Specifications consistent with the approved PER must be submitted during this period. Approval of the PER does **not** (a) guarantee that a SCDHEC Construction Permit will be issued for the project and (b) extend to include closeout of the associated treatment pond(s).

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When issued, the construction permit will include a special condition that addition of a separate waste sludge storage unit may be required at a later date as deemed necessary by the Department. This is necessitated by the fact that accumulation of fresh and stale sludge in the primary clarifier may lead to operational and/or other problems.

Please write or call Mr. Murali Koppa of my staff at 803/898-4220 with any related questions.

Sincerely,

Michael Montebello, Manager
Domestic Wastewater Permitting Section
Water Facilities Permitting Division

MJM:

cc: Robin Foy, Enforcement
CM EQC District Office
Jeff deBessonet, DHEC
Murali Koppa, DHEC

PRELIMINARY ENGINEERING REPORT

MIDLANDS UTILITY, INC.

RAINTREE ACRES / DUTCH VILLAGE

WASTEWATER TREATMENT PLANT REPLACEMENT

Prepared for:
Midlands Utility, Inc.
816 East Main Street
Lexington, South Carolina 29072

PRELIMINARY ENGINEERING REPORT

MIDLANDS UTILITY, INC.

RAINTREE ACRES / DUTCH VILLAGE

WASTEWATER TREATMENT PLANT REPLACEMENT

Prepared for:
Midlands Utility, Inc.
816 East Main Street
Lexington, South Carolina 29072

Prepared by:
HPG and Company, Consulting Engineers, Inc.
1432 Sunset Boulevard
West Columbia, South Carolina 29169

June, 2004

TABLE OF CONTENTS

I INTRODUCTION

A. GENERAL

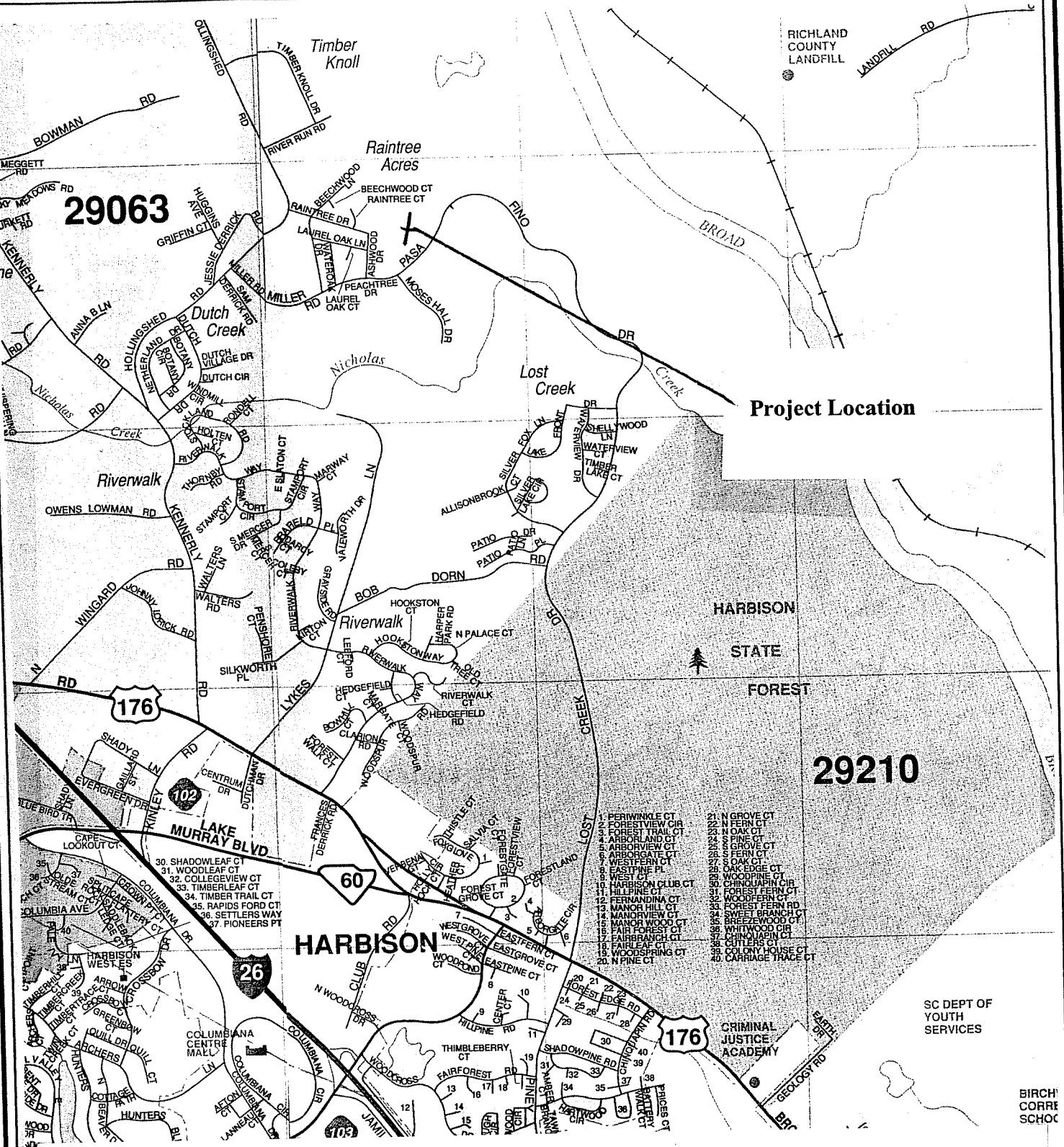
Midlands Utility is a privately owned, public utility which owns, operates and maintains a number of wastewater collection and treatment facilities within Richland and Lexington County. One of these facilities serves two subdivisions north of Columbia in the Irmo / Harbison area. These subdivisions are known as Raintree Acres and Dutch Village / Dutch Creek. This particular collection and treatment system provides wastewater service for approximately 317 residences. A location map is provided in Figure I-1 showing the location of this particular facility.

B. CONTACTS

The various contacts for this project are as follows:

Owner: Midlands Utility, Inc.
816 East Main Street
Lexington, South Carolina 29072
Contacts: Keith G. Parnell, P.E., President
Telephone: (803) 359-4803
Facsimile: (803) 359-2374

Engineer: HPG and Company, Consulting Engineers, Inc.
1432 Sunset Boulevard
West Columbia, South Carolina 29169
Contacts: Charles K. Parnell, P.E.
Telephone: (803) 739-2888
Facsimile: (803) 739-2277



Location Map
Raintree / Dutch Creek Subdivision
Replacement Wastewater Treatment Facility

Scale: 1"=2500'(+/-)

C. PURPOSE / PROJECT NEED

This facility from time to time violates some parameters of the NPDES discharge permit. The violations include exceedence of biochemical oxygen demand (BOD_5), fecal coliform and flow. The facility is an aerated lagoon system and realistically can not perform day in and day out to produce an effluent meeting the requirements of the current NPDES permit. Some excursions will occur due to the nature and lack of process controls associated with a lagoon system.

Midlands Utility has entered into a Consent Order (03-043-W) (see Appendix A) with the SC Department of Health and Environmental Control to deal with options of either tying the system into Richland County and eliminating the facility or upgrading the facility with a new advanced treatment process.

D. CONSENT ORDER REQUIREMENTS

As discussed in the previous section, a consent order was entered into on April 4, 2003 between SCDHEC and Midlands Utility, the consent order identifies two paths for compliance. The first is the requirement to submit a contract between Midlands Utility and Richland County for wholesale treatment and facility elimination to the SC Public Service Commission (PSC) for their denial or approval. A contract was submitted to the PSC on July 3, 2003 which was denied by the PSC due to the cost of service from Richland County. The PSC ruling is available upon request.

The second path resulting from the denial of a wholesale treatment contract requires the construction of a replacement wastewater treatment facility. This Preliminary Engineering Report provides compliance with the consent order requirements.

TABLE I.I
CONSENT ORDER
COMPLIANCE SCHEDULE

Description		*Date*
1.	Date of Consent Order	April 7, 2003
2.	Submit Richland County contract to PSC	60 days June 6, 2003
3.	If PSC approves contract	
	3a. Submit plans and specifications for connection (also lagoon closure plan)	60 days from PSC order
	3b. Begin construction	45 days from permit issuance
	3c. Make operational	120 days from beginning construction
	3d. Close-out lagoon	270 days from operating permit
4.	If PSC denies contract	
	4a. Submit PER for WWTF upgrade	No date
	4b. Submit plans and specifications for WWTF	60 days after PER approval
	4c. Begin construction	90 days after permit issuance
	4d. Make operational	180 days after beginning construction
	4e. Lagoon close-out	No date

II EXISTING FACILITY EVALUATION

A. NPDES PERMIT

Midlands Utility does not currently have an active NPDES permit for this facility. It however continues to operate the facility to conform with the requirements of the expired permit, SC0039055. This permit expired on June 30, 1991 and its re-issue has been refused by SCDHEC in efforts to force its connection to Richland County. The Public Service Commission has determined that a connection to Richland County not cost effective. The limits of this permit are listed in the following Table II.1.

TABLE II.I
NPDES PERMIT LIMITS

Parameter	*Concentration*
Dissolved Oxygen	2.0 min., instantaneous
BOD_5	30 mg/l
pH	6.0 - 9.0 std. Units
Total Suspended Solids	90 mg/l
Flow	0.140 MGD
Total Residual Chlorine	0.5 mg/l average 1.0 mg/l maximum
Fecal Coliform	200 # per 100 ml - average 400 # per 100 ml - maximum

B. HISTORICAL PERFORMANCE OF FACILITY

Midlands Utility, through their laboratory, samples and tests for the parameters shown in Table II.1. The following, Table II.2 shows discharge parameter data for the past twelve months as shown on the discharge monitoring reports (DMR).

TABLE II.2
LABORATORY DATA

Month	*BOD*	*TSS*	*DO*	pH
May, 2004	14	47	3.1	6.0 - 6.7
April, 2004	21.5	61	3.4	6.0 - 7.2
March, 2004	22	38	6.0	7.0 - 8.5
February, 2004	29.5	36	4.0	6.8 - 8.3
January, 2004	28	21..5	3.2	6.2 - 7.6
December, 2003	21	36	3.2	6.1 - 7.2
November, 2003	34.5	19.5	2.3	6.1 - 6.8
October, 2003	15	27.5	2.3	6.2 - 6.8
August, 2003	19	20	3.4	6.1 - 7.4
July, 2003	15.5	22	2.6	6.0 - 7.1
June, 2003	37.5	39.5	3.2	6.4 - 8.2
May, 2003	11	21	3.1	6.1 - 7.5

pH expressed in standard units.
All other units expressed as milligrams per liter.

Table II.3 follows which presents flow data for the plant over the past twelve months. Also presented is data showing a ratio of actual flow to allowable flow each month.

TABLE II.3
FLOW DATA

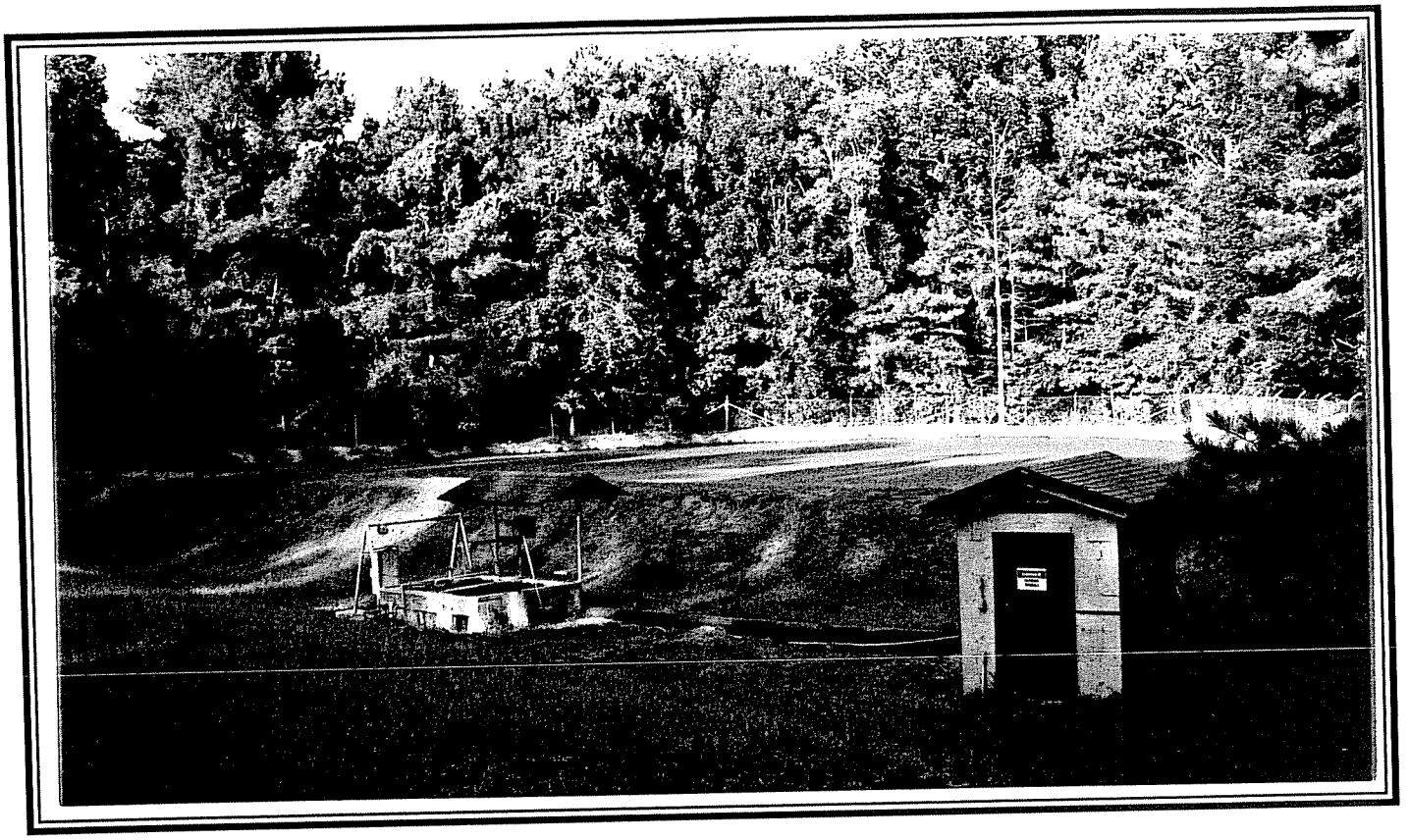
Month	*Flow*	*Ratio to Permit*
May, 2004	0.05	36%
April, 2004	0.0495	36%
March, 2004	0.059	42%
February, 2004	0.094	67%
January, 2004	0.077	55%
December, 2003	0.076	54%
November, 2003	0.063	45%
October, 2003	0.059	42%
August, 2003	0.061	44%
July, 2003	0.093	66%
June, 2003	0.150	100%

C. LAGOON SYSTEM

The treatment facility is comprised of a single aerated lagoon (photograph c.1) with two hp surface aerators. Flow enters the lagoon from the left corner of the basin (photograph) and exits the opposite corner. Flow travels from the aerated lagoon to a polishing pond (photograph C.2). Flow from the polishing pond then exits the polishing pond and flows to the chlorine contact chamber and effluent pump station. A site plan of the current plant is shown in Figure II.1.

Photograph C.1

Shown in this photograph is the aerated lagoon. The lagoon contains two 7.5 hp aerators in a concrete lined basin. Flow enters the lagoon from the bottom left corner of the photograph and exits the lagoon at the top right corner. The entire site is fenced for security. At current average daily flow the hydraulic detention is approximately 4 days.



Photograph C.2

Shown in this photograph is the polishing pond in the background. Flow enters the pond from the left of the photograph, and then travels through the pond. The building in the foreground is the chlorine building which houses the feed equipment. The concrete structure to the left of the building is the chlorine contact chamber and effluent pump station. The piping shown connects the effluent from the polishing pond to the chlorine contact chamber.

D. EFFLUENT FORCE MAIN / RIVER DISCHARGE

The effluent from this facility is collected at the effluent pump station. The pump station pumps through a 4-inch diameter force main for a distance of approximately 3,000 feet. Discharge is to the Broad River through a submerged outlet into the river.

III PROPOSED TREATMENT FACILITY

A. GENERAL

The proposed replacement plant will be a sequencing batch reactor (SBR) designed at not less than 140,000 gallons per day and be capable of treatment levels of 10/10/1 (BOD_5 / TSS / NH_3-N), far superior to that of the existing aerated lagoon. The current NPDES discharge limits for this facility is as follows:

Table III.1
Current NPDES Discharge Limits

	Monthly Average	*Weekly Average*
Flow	0.14 MGD	0.14 MGD
BOD_5 (20° C)	30 mg/l	45 mg/l
Total Suspended Solids	90 mg/l	135 mg/l
pH	6 - 8 std units	6 - 8 std units
Total Residual Chlorine	0.5 mg/l	1.0 mg/l
Fecal	200 #/100ml	400 #/100 ml
DO	2.0 mg/l (min)	5.0 mg/l (min)
Total Nitrogen	M / R	M / R
Total Phosphorous	M / R	M / R

It is anticipated that the TSS limits may change as a result of an alternative process selection. That change has been anticipated in the SBR process.

B. PROPOSED PLANT CONFIGURATION

The new plant will consist of the following units of operations:

- Mechanical screening
- Manual standby screening
- on-line emergency / contingent influent storage
- Dual train sequencing batch reactor basins
- Diffused aeration
- Aerated Digester
- Controls
- Post SBR equalization and aeration with controlled peak rate discharge
- Dual UV disinfection
- Post, flow monitoring
- Discharge to Broad River (utilization of existing)
- Standby power

C. INFLUENT WASTEWATER CHARACTERISTICS

The waste stream to this facility is typical domestic, generated by residential users. There are no industrial or commercial users of the system. The wastewater delivered to this facility is believed to have the following generalized characteristics:

Table III.2
Influent Wastewater Characteristics

Average flow	140,000 gpd
Peak flow	380,000 gpd
BOD_5 (20° C)	220 mg/l
BOD_5 (20° C)	275 lbs/ day
Suspended solids	220 mg/l
NH_3 - N	30 mg/l
Alkalinity	150 mg/l
Wastewater temperature	20° C
Ambient air temperature	20 - 90° F
Site elevation	300 ft.

D. DESIGN EFFLUENT QUALITY

Although the current NPDES permit discharge limits are not particularly stringent, it is believed to be remiss not to design an advanced wastewater treatment facility. As a result the utility will approach the design of the new facility which will be capable of producing an effluent exceeding the quality shown in Table III.1 and the following:

Table III.3
Effluent Quality
(Average Monthly)

BOD_5 (20°c)	< 10 mg/l
Total suspended solids	< 10 mg/l
NH_3 - N	< 1.00 mg/l

E. PLANT RELIABILITY

A number of conversations with SCDHEC indicate that this facility must establish and implement class I reliability. This primary purpose, to protect surface waters and their usage. To achieve class I reliability, the following will be incorporated into the facility design.

- Standby / auxiliary power will be provided to operate the facility in case of power outage.
- A portion of the existing lagoon system will be utilized for contingent influent storage. The basin volume will exceed the twenty-four (24) hour design flow of the facility.
- Dual SBR trains will be installed.
- One mechanical bar screen will be installed along with a manual cleaned back-up screen.
- All pumps in the system will be duplicated with capacity of each capable of handling the average flow. Not less than 2 units will be provided.
- Each SBR train will have an independent clarification sequence.

- The dual SBR trains will each have a capacity equal to the design capacity of the entire facility.
- Aeration blowers will have identical back-up units, each capable of supplying aeration for the entire facility. Not less than 2 units will be provided.
- Dual disinfection units will be provided each capable of treating the entire facility.

F. SBR DESIGN CRITERIA

The sequencing batch reactor process is chosen as the proposed method to provide a high level of treatment prior to discharge. The SBR will be provided as two independent treatment trains, each capable of handling the entire plant design flow. The process will be divided into the following treatment components:

- Screening
- Influent pumping pre-reactor
- SBR zone with diffused aeration and mixing
- Decanter
- Post SBR flow equalization with constant rate discharge device
- Dual ultraviolet light disinfection
- Effluent flow metering
- Discharge (existing discharge location)

Complete design calculations for the process are contained in Appendix C of this report.

G. SLUDGE HANDLING

The existing facility has no sludge handling or dewatering facilities. The selected process has sludge storage in excess of 60 days at design treatment rates. The utility has a tanker which will be utilized to transport the sludge to the Bush River Facility for dewatering or treatment at other approved disposal sites (i.e. Bio-Tech). No separate sludge treatment / dewatering will be provided.

H. COST ESTIMATE

The new plant will be constructed on the existing plant site. The estimated cost for this work is itemized in the following table.

Table III.4
SBR Plant Construction

Item	*Description*	*Cost*
1.	Influent pump station	$ 50,000.00
2.	New bar screen, structure and equipment	25,000.00
3.	SBR equipment	131,000.00
4.	SBR equipment installation	10,000.00
5.	Tankage	65,000.00
6.	Concrete foundation	75,000.00
7.	Electrical	20,000.00
8.	Piping	15,000.00
9.	Influent Equalization	75,000.00
10.	UV Disinfection equipment and installation	25,000.00
	Total Construction	$ 491,000.00
	Engineering	40,000.00
	Contingencies	40,000.00
	Total Project Cost	$ 571,000.00

I. IMPLEMENTATION SCHEDULE

To construct the new facility, the following schedule is proposed. This schedule is obviously contingent on the review and approval periods. The actual on-line date will be affected by these.

Submit Preliminary Engineering Report	June 16, 2004
Approve Preliminary Engineering Report	November, 2004
Submit Construction Drawings	February 15, 2005
Approve Construction Drawings	March 15, 2005
Begin Construction	June 15, 2005
End Construction	December 15, 2005
Place System in Operation (final SCDHEC approval)	December 15, 2005

APPENDIX A

SCDHEC CONSENT ORDER

THE STATE OF SOUTH CAROLINA
BEFORE THE DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

IN RE: MIDLANDS UTILITY, INC.
RAINTREE ACRES SUBDIVISION
RICHLAND COUNTY

CONSENT ORDER
03-043-W

Midlands Utility, Inc. (Respondent) owns and is responsible for the proper operation and maintenance of a wastewater treatment facility (WWTF) serving the residents in and contiguous to Raintree Acres and Dutch Creek Subdivisions located in Richland County, South Carolina.

A review of the Respondent's file by the South Carolina Department of Health and Environmental Control (Department) revealed that the Respondent violated the Pollution Control Act, S.C. Code Ann. §§ 48-1-10 et seq. (1987 & Supp. 2002) and National Pollutant Discharge Elimination System (NPDES) Permit SC0039055 in that it exceeded the permitted discharge limits for biochemical oxygen demand (BOD), fecal coliform bacteria (FC), and flow, and failed to properly operate and maintain the WWTF in accordance with the NPDES permit. In addition, the Respondent failed to provide for daily visits by a certified operator of appropriate grade, and failed to sample pH and dissolved oxygen (DO) on a daily basis, as required by the NPDES permit.

In accordance with approved procedures and based upon discussions with the Respondent on February 8, 2001, October 17, 2002, and March 27, 2003, the parties have agreed to the issuance of this Order to include the following Findings of Fact and Conclusions of Law.

In the interest of resolving this matter without delay and expense of litigation the Respondent agrees to the entry of this Consent Order, but neither agrees nor disagrees with the Findings of Fact or the Conclusions of Law; and therefore, agrees that this Order shall be deemed an admission of fact

and law only as necessary for enforcement of this Order by the Department or subsequent actions relating to the Respondent by the Department.

FINDINGS OF FACT

1. NPDES Permit SC0039055 allows the Respondent to discharge treated wastewater to Broad River in accordance with the effluent limitations, monitoring requirements and other conditions as set forth therein. The permit expired April 30, 1990. The permit was not reissued due to the designation of the WWTF for elimination by the area-wide 208 plan.

2. On August 28, 2000, the Department issued a Notice of Violation to the Respondent for violations of the permitted discharge limits for BOD, FC, and flow during the January 1, 2000, through June 30, 2000, monitoring periods. In a letter dated September 8, 2000, the Respondent replied to the NOV, stating that it had a pending contract with a regional sewer provider, and that it would continue to operate the WWTF until the regional sewer provider obtained the necessary capacity for the connection.

3. A review of Operation and Maintenance (O&M) and Compliance Sampling Inspections (CSIs) performed on the Respondent's WWTF by Department staff for the January 1, 2000, through April 30, 2002, monitoring periods has revealed the following deficiencies:

Inspection Date	Type	Rating	Deficiencies Noted
01/17/2000	O&M	Unsatisfactory	Flow meter not properly calibrated, only one aerator operating, no daily visits by operator, pH and DO not sampled daily
01/17/2000	CSI	Compliant	None
06/12/2000	CSI	Noncompliant	FC
08/08/2000	O&M	Unsatisfactory	Flow meter not properly calibrated, only one aerator is working
10/02/2000	CSI	Noncompliant	FC

10/01/2001	CSI	Compliant	None
02/25/2002	CSI	Noncompliant	BOD
04/01/2002	CSI	Noncompliant	BOD

4. A review of discharge monitoring reports submitted by the Respondent for the January 1, 2000, through January 31, 2003, has revealed the following violations of the permitted discharge limits:

BOD - January, May, August, October and November 2000, January, February, March, May and September 2001, and February, March and April 2002;

Flow - January 2000; and

FC - June 2000.

5. The Respondent is a public utility regulated by the South Carolina Public Service Commission (PSC).

6. PSC Regulation R.103-541 provides for PSC approval of all utility contracts including connection agreements by sewer systems with a regional provider.

CONCLUSIONS OF LAW

Based upon the above Findings of Fact, the Department reaches the following Conclusions of Law:

1. The Respondent violated the Pollution Control Act, S.C. Code Ann.§ 48-1-110 (d) (Supp. 2002), and Water Pollution Control Permits, 24 S.C. Code Ann. Regs. 61-9.122.41(a)(1) (Supp. 2002), in that it failed to comply with the permitted discharge limits for BOD, FC and flow as specified in Part I.A.1 of the NPDES permit.

2. The Respondent violated the Pollution Control Act, S.C. Code Ann.§ 48-1-110(d) (Supp. 2002), and Water Pollution Control Permits, 24 S.C. Code Ann. 61-9.122.41(e) (Supp.

2002), in that it failed to, at all times, properly operate and maintain the WWTF in accordance with the NPDES permit.

3. The Pollution Control Act, S.C. Code Ann.§ 48-1-330 (1987), provides for a civil penalty not to exceed ten thousand dollars ($10,000.00) per day of violation for any person violating the Act or any rule, regulation, permit, permit condition, final determination, or Order of the Department.

NOW, THEREFORE, IT IS ORDERED, pursuant to the Pollution Control Act, S.C. Code Ann. 48-1-50 (1987) and § 48-1-100 (Supp. 2002), that the Respondent shall:

1. Within sixty (60) days of the execution date of this Order, submit to the PSC for approval a contract for sewer service with the regional sewer provider.

2. If the contract is approved by the PSC:

   a) Within sixty (60) days of the PSC's final Order, submit to the Department administratively complete plans and specifications and an application for a permit to construct addressing elimination of the discharge by connection to regional sewer, including a plan for closure of the WWTF in accordance with Water Pollution Control Permits, 25 S.C. Code Ann. Regs. 61-9.503 (Supp. 2002), Proper Closeout of Wastewater Treatment Facilities, S.C. Code Ann. Regs. 61-82 (1976), and Standards for Wastewater Facility Construction, S.C. Code Ann. Regs. 61-67 (Supp. 2002). The closure plan may address closure in two (2) phases: treated wastewater removal, then sludge management and other closure issues.

   b) Within forty-five (45) days of the issuance of the permit to construct, begin construction on the connection to regional sewer.

   c) Within one hundred twenty (120) days of beginning construction, complete

construction of the connection to regional sewer and divert influent wastewater from the WWTF to the regional sewer system. The Respondent may discharge residual liquids from the WWTF for a period of ninety (90) days under the terms and conditions of the NPDES permit.

d) Within two hundred seventy (270) days of date when the influent flow is diverted to the regional sewer system, close out the WWTF in accordance with the approved plan.

3. If the PSC denies the contract:

a) Within sixty (60) days of the Department's approval of the PER, submit to the Department administratively complete plans and specifications and an application for a permit to construct addressing upgrade of the WWTF to meet permitted discharge limits.

b) Within ninety (90) days of issuance of the permit to construct, begin construction of the permitted upgrade to the WWTF.

c) Within one hundred eighty (180) days of beginning construction, complete construction of the upgrade to the WWTF and request operational approval from the Department. After the permit to operate is issued, immediately divert influent wastewater to the new WWTF. In order to comply with the Reliability Classification I requirements as specified in Standards for Wastewater Facility Construction, S.C. Code Ann. Regs. 61-67 (Supp. 2002), the Department will allow an additional one hundred eighty (180) days for the Respondent to have the necessary components constructed to meet Reliability Class I requirements as it may relate to the conversion of the lagoon system to other functions.

4. Pay to the Department a civil penalty in the amount of thirteen thousand two hundred dollars ($13,200.00), payable in quarterly installments over a period of thirty (30) months, together with interest on the outstanding balance calculated at 8.75% per annum, with the first installment due on May 5, 2003. The Respondent may pay the penalty in full at any time.

IT IS FURTHER ORDERED AND AGREED that where the Department or the PSC has requested information in connection with the above actions, the Respondent shall respond to such requests in a timely fashion.

THEREFORE IT IS FURTHER AGREED that if any event occurs which causes or may cause a delay in meeting any of the above scheduled dates for completion of any specified activity, the Respondent shall notify the Department in writing at least one (1) week before the scheduled date, describing in detail the anticipated length of the delay, the precise cause or causes of delay, if ascertainable, the measures taken or to be taken to prevent or minimize the delay, and the timetable by which those measures will be implemented.

The Department shall provide written notice as soon as practicable that a specified extension of time has been granted or that no extension has been granted. An extension shall be granted for any scheduled activity delayed by an event of *force majeure*, which shall mean any event arising from causes beyond the control of the Respondent that causes a delay in or prevents the performance of any of the conditions under this Consent Order including, but not limited to: a) acts of God, fire, war, insurrection, civil disturbance, explosion; b) adverse weather condition that could not be reasonably anticipated causing unusual delay in transportation and/or field work activities; c) restraint by court order or order of public authority; d) inability to obtain, after exercise of reasonable diligence and timely submittal of all applicable applications, any necessary authorizations, approvals, permits, or licenses due to action or inaction of any governmental agency

or authority; and e) delays caused by compliance with applicable statutes or regulations governing contracting, procurement or acquisition procedures, despite the exercise of reasonable diligence by the Respondent.

Events which are not *force majeure* include by example, but are not limited to, unanticipated or increased costs of performance, changed economic circumstances, normal precipitation events, or any person's failure to exercise due diligence in obtaining governmental permits or fulfilling contractual duties. Such determination will be made in the sole discretion of the Department. Any extension shall be incorporated by reference as an enforceable part of this Consent Order and thereafter be referred to as an attachment to the Consent Order.

PURSUANT TO THIS ORDER, all communication regarding this Order and its requirements shall be addressed as follows:

Anastasia Hunter-Shaw
Water Enforcement Division
Bureau of Water
SCDHEC
2600 Bull Street
Columbia, S.C. 29201

IT IS FURTHER ORDERED AND AGREED that failure to comply with any provisions of this Order shall be grounds for further enforcement action pursuant to the Pollution Control Act, S.C. Code Ann. § 48-1-330 (1987), to include the assessment of additional civil penalties.

THE SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

Kenneth L. Kaiser

DATE: 4/7/03

R. Lewis Shaw, P.E,
Deputy Commissioner for EQC

Alton C. Boozer

Alton C. Boozer, Chief
Bureau of Water

DATE: 7 April, 2003

WE CONSENT:

Karl A. Pound

Midlands Utilities, Inc.

DATE: 4/4/03

Mason A. Summers

Attorney for the Department

DATE: 4/4/03

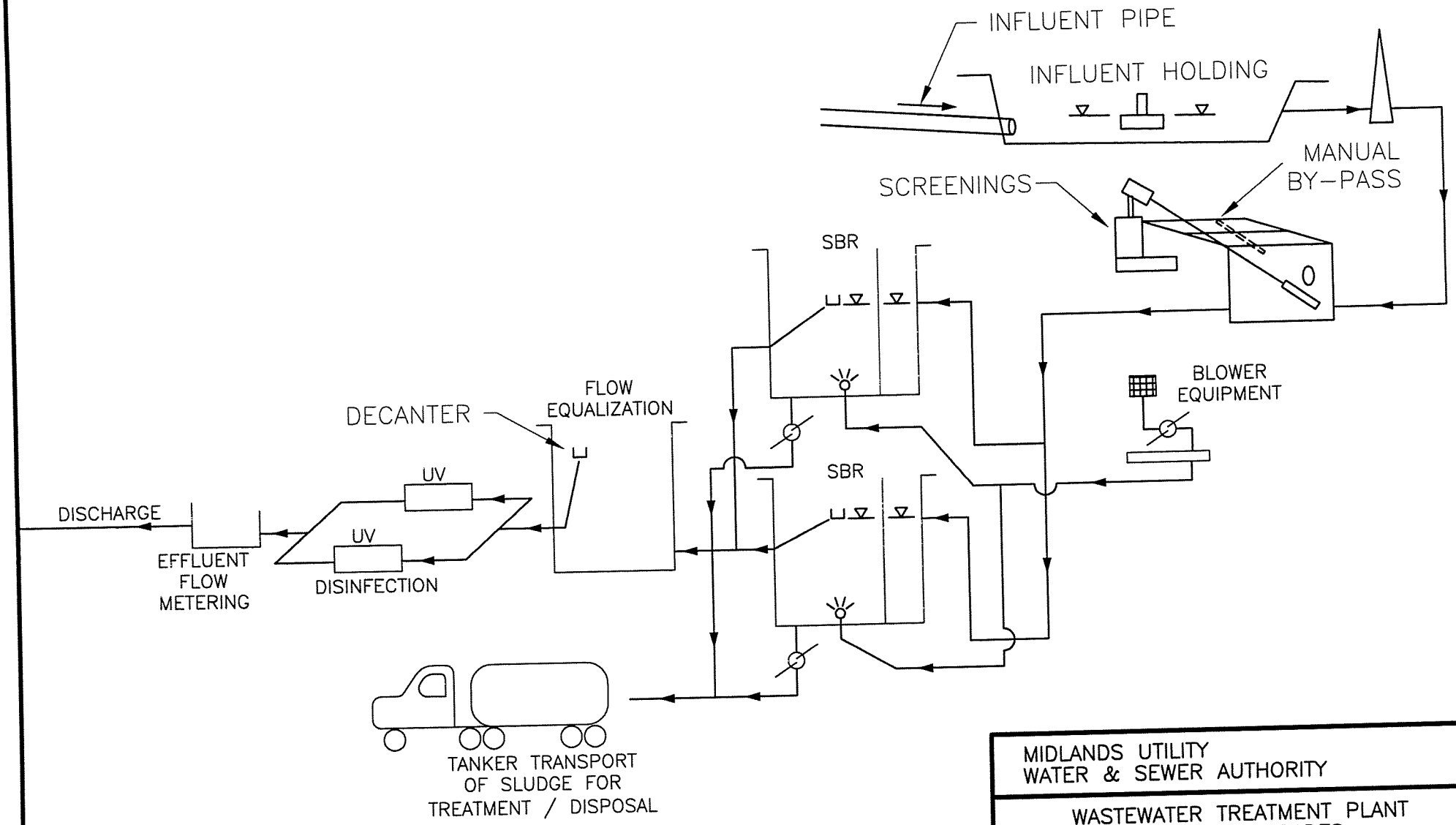
Valerie A. Betterton

Valerie A. Betterton, Director
Water Enforcement Division

DATE: 4/7/03

APPENDIX B

NEW SBR PROCESS SCHEMATIC



PLANT FLOW SCHEMATIC
RAINTREE WASTEWATER TREATMENT FACILITY

NOT TO SCALE

MIDLANDS UTILITY WATER & SEWER AUTHORITY		
WASTEWATER TREATMENT PLANT FACILITY UPGRADES		
APPROVED BY: CKP	DATE: 06/14/04	DRAWING NO: 01054
SCALE: NONE	REVISED:	

APPENDIX C

PROCESS CALCULATIONS

FLUIDYNE CORPORATION

2816 West First Street
Cedar Falls, Iowa 50613
Phone: (319) 266-9967
Fax: (319) 277-6034

Reply to: 2202 Gold Oak Lane
Sarasota, Florida 34232
Phone: (941) 342-8915
Fax: (941) 342-9765

ISAM™ SBR with Aspirating Jet Aeration System

Design Calculations For

Midland Utilities - Raintree WWTP

Mar. 1, 2004

I. DESIGN CONDITIONS:

Design flow	=	0.15 MGD
Peak daily flow	=	0.38 MGD (Assumed)
Peak hourly flow	=	313 GPM (Assumed)
Influent BOD_5	=	220 mg/l (Assumed)
	=	275 lbs./day
Effluent BOD_5	=	10 mg/l
Influent TSS	=	220 mg/l (Assumed)
Removal in anaerobic chamber	=	65%
TSS to SBR	=	77 mg/l
Effluent TSS	=	10 mg/l
Influent TKN	=	30 mg/l (Assumed)
	=	38 lbs./day
Effluent NH_3-N	=	2 mg/l
Effluent total N	=	5 mg/l (Assumed)
Design MLSS (Full reactor)	=	3,000 mg/l
Design F:M	=	0.09
SRT (SBR)	=	15 days
SRT (SBR plus SAM))	=	23 days
Elevation	=	200 ft. MSL (Assumed)
Average barometric pressure	=	14.58 psia

II. BASIN DESIGN:

SBR basin	=	2
Length	=	44 ft. 0 in.
Width	=	11 ft. 10 in.
TWL	=	10 ft. 6 in.
BWL	=	8 ft. 0 in.
Volume	=	81,786 Gallons
Retention time	=	13.1 hrs.

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Phone: (941) 342-8915
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SAM™ reactor basin	=	2
Length	=	22 ft. 0 in.
Width	=	11 ft. 10 in.
Maximum SWD	=	10 ft. 6 in.
Minimum SWD	=	2 ft. 6 in.
Working volume	=	31,157 Gallons
Anaerobic chamber	=	2
Length	=	22 ft. 0 in.
Width	=	11 ft. 10 in.
SWD	=	10 ft. 6 in.
Volume	=	40,893 Gallons

III. OXYGEN REQUIREMENT:

lbs. O_2 / lb. BOD_5 removed	=	1.25
lbs. O_2 / lb. TKN oxidized	=	4.6
lbs. O_2 recovered/ lb. NO_3 denitrified	=	1.84
Actual Oxygen Required	=	405 lbs./day

Actual to Standard Oxygen Conversion Formula:

$$SOR = \frac{AOR}{\alpha\theta^{(T-20)}\left\{\frac{\beta C_{SMID} - C_L}{C_S\left[1+\frac{0.5\,(D)}{34}\right]}\right\}}$$

Where:

α	=	0.85	β	=	0.95
T	=	20 ° C	θ	=	1.024
C_S	=	9.09	C_L	=	1.0 mg/l

C_{SMID} = Oxygen saturation concentration at 50 % depth at site elevation and temperature.

C_{SMID} = 10.43 mg/l

Therefore:

Standard Oxygen Required = 562 lbs./day

IV. PROCESS DESIGN

Cycle time at design flow	=	3.12 hrs.
Fill time	=	0.12 hrs.
Interact time (Maximum)	=	1.92 hrs.

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Interact time (Design)	=	1.44	hrs.
Settle time	=	0.75	hrs.
Decant time	=	0.32	hrs.
Total cycle time	=	3.12	hrs.
Total aeration time	=	1.56	hrs./cycle
	=	24	hrs./day
SOR for aeration design	=	23.4	lbs./hr.
Aspirating jets per basin	=	2	
BHp required per aspirator	=	7.32	
Aspirator model	=	SAA 10 /2	

VI. PUMP CALCULATIONS:

Jet motive/fill pump:

Pumps per basin	=	1	
Flow per pump	=	1,324	GPM
Total pump head	=	35	ft.
Assumed pump efficiency	=	75	%
BHp per pump	=	15.60	
Pump motor Hp	=	20	

VII. DECANTER SIZING:

Cycles per day	=	15.41	
Batch size	=	9,736	Gallons
Decant flow	=	500	GPM

VIII. SUMMARY:

Design Standard Oxygen Required	=	562	lbs./day
Avg. BHp for 24 hrs. @ design SOR	=	15.60	
Power usage	=	279	KWH/day

IX. SLUDGE PRODUCTION CALCULATIONS:

Inert accumulation	=	0.21	lbs./lb. BOD_5 removed
VSS production	=	0.47	lbs./lb. BOD_5 removed
Total sludge yield	=	0.68	lbs./lb. BOD_5 removed
Anaerobic volatile sludge reduction	=	60%	
Waste sludge concentration	>	4%	
Sludge production	=	104	lbs. day
	=	312	GPD
Sludge storage	=	61	days

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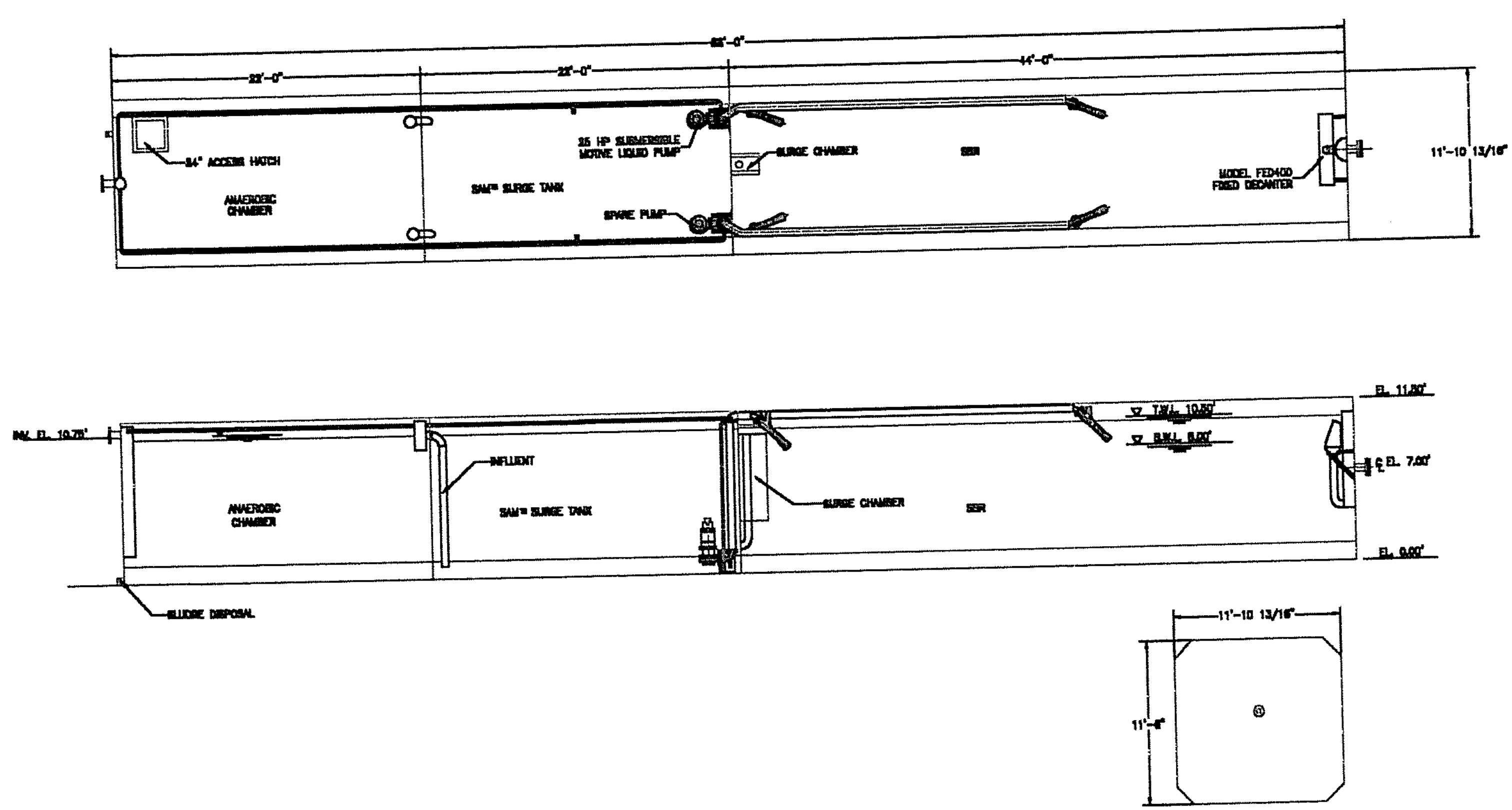
X. NITRIFICATION/DENITRIFICATION

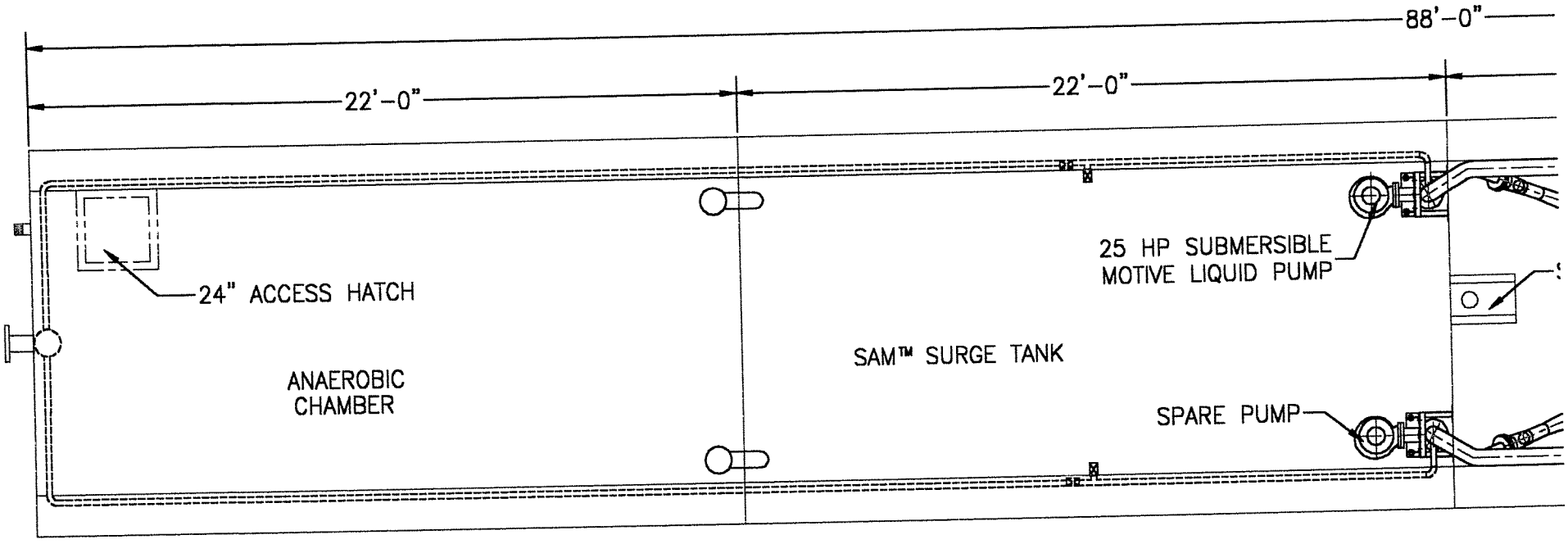
Minimum mixed liquor temperature	=	10 ° C
Mixed liquor dissolved oxygen	=	1.0 mg/l
Alkalinity required for nitrification	=	136 mg/l
Alkalinity recovered, denitrification	=	42 mg/l
Net influent alkalinity required	=	94 mg/l
Max. nitrifier growth rate	=	0.125 $days^{-1}$
Minimum SRT required for nitrification	=	7.99 days
Actual SRT (SBR)	=	15.15 days
Kn, half velocity constant	=	0.22 mg/l
Des. growth rate for heterotrophs/nitrifier	=	0.066
Projected effluent soluble NH_3-N	=	0.25 mg/l
Specific utilization rate	=	0.21 lbs BOD_5/lb MLVSS
MLVSS required for BOD & NH_3 remova	=	1,305 lbs.
MLVSS	=	2,100 mg/l
Tank volume req. for BOD & NH_3 remov	=	0.075 MG
Denitrification rate	=	0.034 g/g/day
MLVSS required for denitrification	=	522 lbs.
Tank volume required for NO_3 removal	=	0.030 MG
Total tank volume required	=	0.1043 MG
Total tank volume provided	=	0.1227 MG

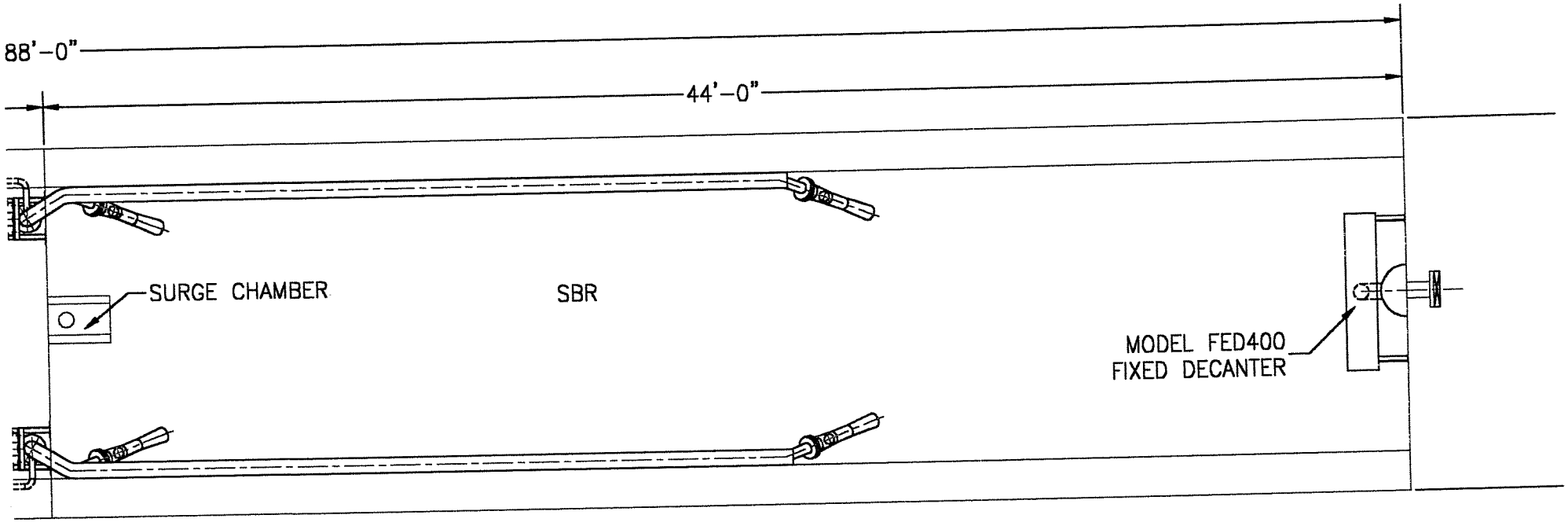


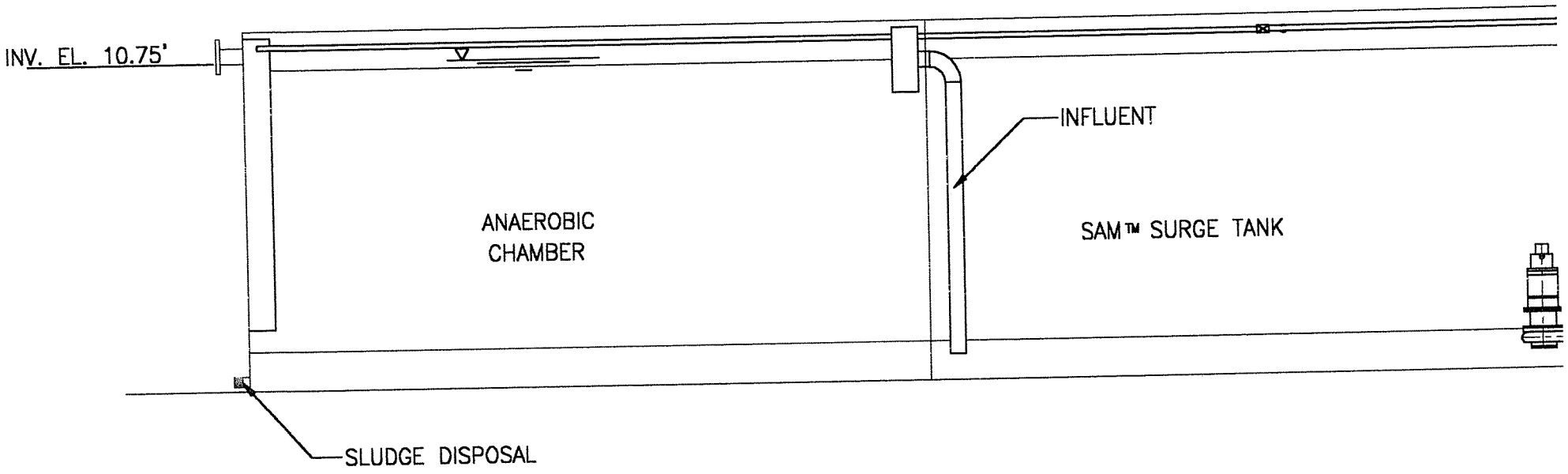
SIZE	DWG NO.	REV
D	001	
SCALE 1/4" = 1'-0"	DATE 10/11/03	SHEET 1 OF 1

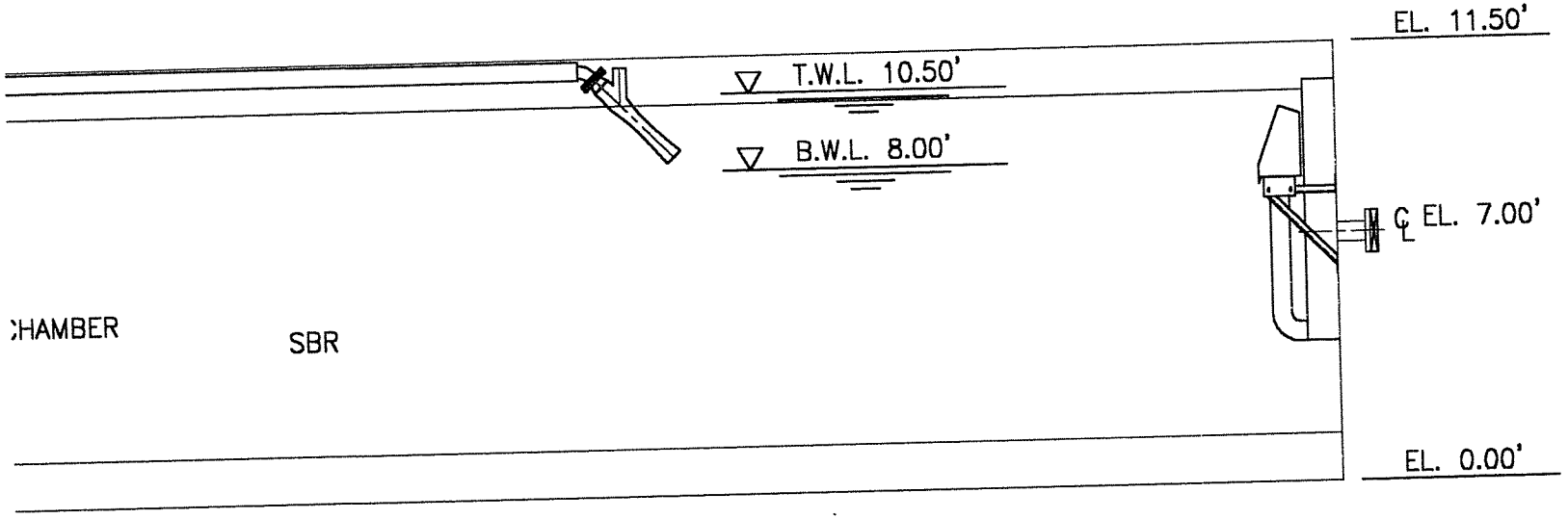
ISAM™ 80
PREPACKAGED SBR

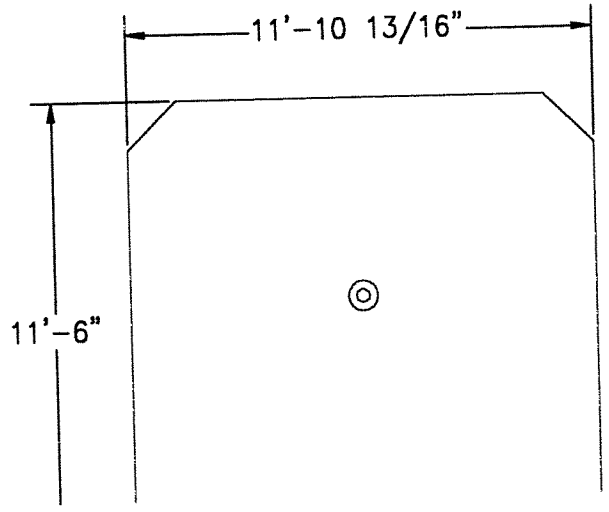
FLUIDYNE CORPORATION


88'-0"
22'-0"
22'-0"
24" ACCESS HATCH
ANAEROBIC
CHAMBER
SAM™ SURGE TANK
25 HP SUBMERSIBLE
MOTIVE LIQUID PUMP
SPARE PUMP


88'-0"
44'-0"
SURGE CHAMBER
SBR
MODEL FED400
FIXED DECANTER


INV. EL. 10.75'
INFLUENT
ANAEROBIC
CHAMBER
SAM™ SURGE TANK
SLUDGE DISPOSAL


EL. 11.50'
T.W.L. 10.50'
B.W.L. 8.00'
℄ EL. 7.00'
CHAMBER
SBR
EL. 0.00'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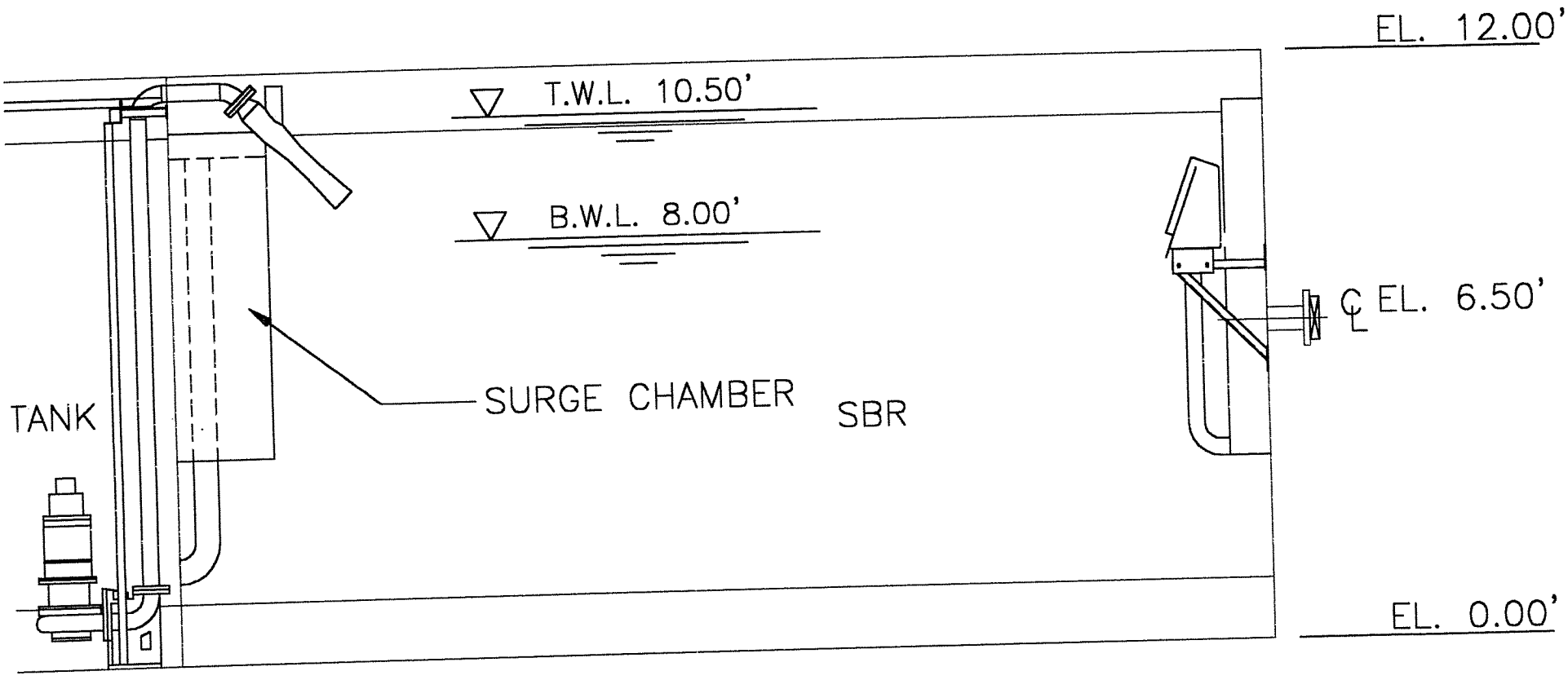
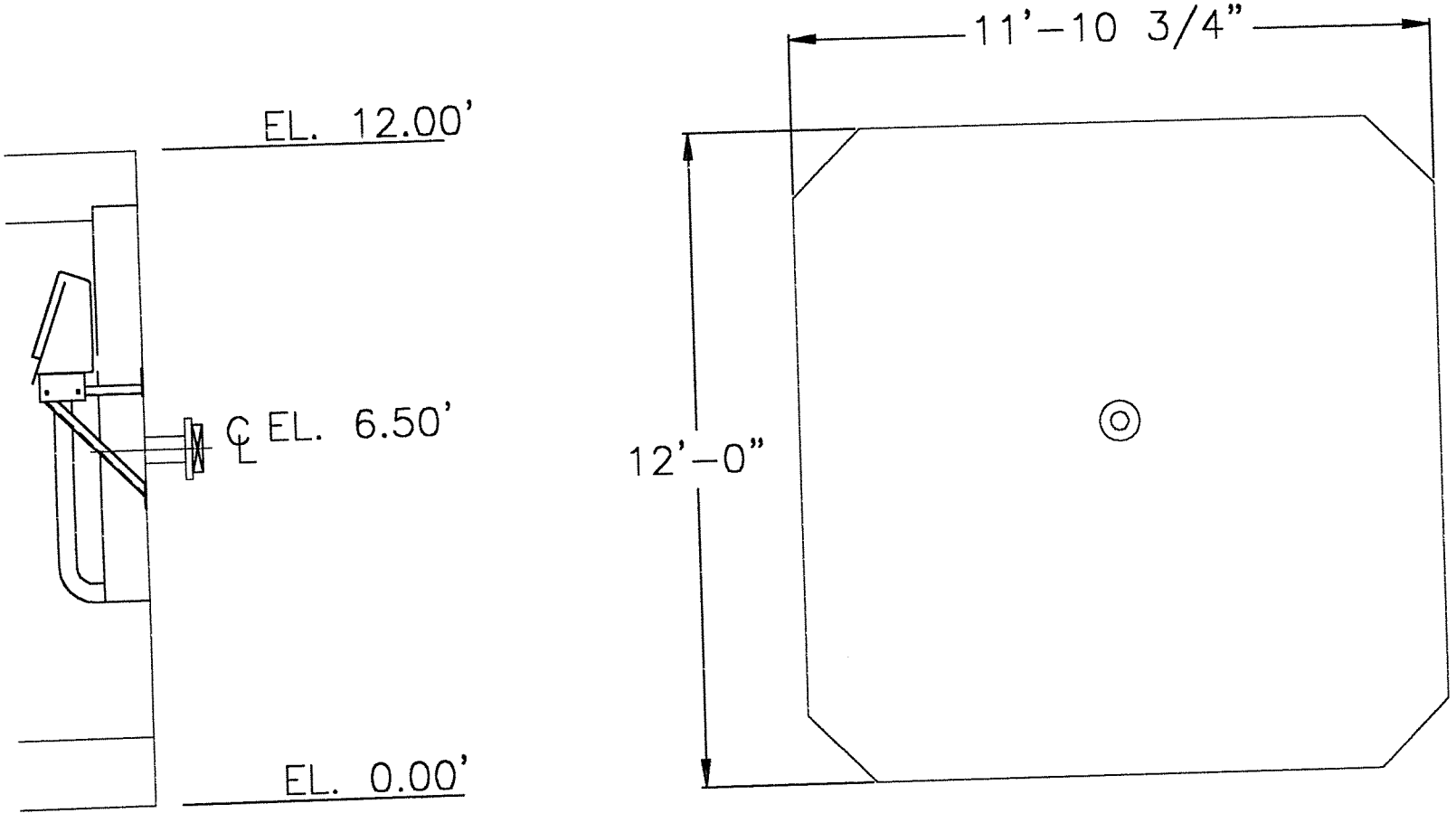
11'-6"


EL. 12.00'
T.W.L. 10.50'
B.W.L. 8.00'
℄ EL. 6.50'
TANK
SURGE CHAMBER
SBR
EL. 0.00'


EL. 12.00'
℄ EL. 6.50'
EL. 0.00'
11'-10 3/4"
12'-0"

SPECIFICATIONS FOR
ISAM™ - SEQUENCING BATCH REACTOR
TREATMENT SYSTEM EQUIPMENT

SCOPE OF WORK:

There shall be furnished, as shown on the plans, all operating equipment and special materials complete with all accessories and appurtenances required for a complete wastewater treatment plant plant with integral sludge reduction system. The equipment shall be a ISAM™ – Sequencing Batch Reactor as manufactured and supplied by Fluidyne Corporation, Cedar Falls, Iowa.

WORK SPECIFIED ELSEWHERE:

The Contractor shall coordinate the work specified in this section with the work of other Contractors in order that all necessary items shall be provided as required for satisfactory operation and that the various items of equipment will properly fit and operate in the spaces allotted to them.

SHOP DRAWINGS:

Shop Drawings shall be submitted on all equipment in this Section.

Complete operation and maintenance instructions for all equipment shall be submitted after the Shop Drawings are approved and equipment has shipped.

ELECTRICAL EQUIPMENT

Wiring at a minimum shall be as recommended by the equipment manufacturer unless indicated otherwise on the drawings or required by local codes. Horsepower indicated and/or specified is approximate only and shall be adjusted to provide the specified capacities.

EQUIPMENT INSTALLATION

The installation of all equipment shall be as recommended by the manufacturer to conform to the particular application involved, in accordance with the details shown on the Drawings. Installation of equipment and connections to equipment shall be completed in every detail in a first-class workmanlike manner. All bearings shall be properly lubricated. Prior to acceptance of all or any part of the work, the Contractor shall test each piece of equipment and furnish written certification that it has been installed in accordance with the manufacturer's requirements and is ready to begin operation.

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MANUFACTURER'S REPRESENTATIVES

The Contractor shall provide the services of a competent factory trained Engineer for the minimum time period specified in each Section. This Engineer shall represent the vendor supplying the equipment, check the installation, and be present for the start-up. A letter certifying that all of the equipment has been properly installed, lubricated and is in satisfactory operating condition shall be filed by the contractor with the Engineer before the installation can be considered complete. Any additional time required to make this certification shall be paid by the Contractor at no additional cost to the Authority.

The Contractor shall also provide the services of a qualified representative of the manufacturer supplying the equipment for the minimum time period specified in each Section. This manufacturer's representative shall instruct the plant personnel on operation, maintenance, and servicing of each unit of

equipment. The Contractor shall schedule the Vendor's representatives through the Engineer for coordination.

PRODUCT SUBSTITUTIONS

Product substitutions may be proposed by the Contractor only in accordance with procedures set forth herein and only at the time of bid. For product substitutions to be considered the Contractor must submit with his bid complete written details, calculations, drawings, and modifications required on the proposed product substitutions. Product substitutions must be bid as deductive alternates with appropriate cost deductions given on the bid form. Any proposed substitutions for surge/anoxic mix equipment must be accompanied by a referenced list in addition to the information required above. The referenced list shall list at least five (5) successful surge/anoxic mix plants that have operated in true sequencing batch reactor mode (surge/anoxic mix control) with names and telephone numbers of appropriate operating personnel. In addition any alternate manufacturer must provide a cash bond or a performance bond guaranteeing performance of the equipment for a three-year period. The amount of the bond shall be equal to 200% of the installed cost of the ISAM™ equipment. The engineer shall have final say in the approval of any proposed substitutions. The engineer's decision on acceptance or rejection of the proposed substitutions shall be final and binding.

All products provided for the contract, whether named product or substitutions, shall be suitable for the intended function and indicated installation. The cost of any redesign or modifications to accommodate products provided shall be borne by the Contractor.

ISAM ™ SEQUENCING BATCH REACTOR

SBR SYSTEM OPERATION:

The treatment plant shall consist of Number () prefabricated integrated steel wastewater treatment systems. The system shall be a Fluidyne Model ISAM Model. The tanks shall consist of three separate compartments for pre-treatment/sludge storage (trash trap tank), flow equalization (anoxic tank) and biological treatment (SBR tank). Each tank shall be nominally Length in length, Width wide, by Height high. A size influent and effluent flange connection with standard 150 lb. flange connection shall be included to allow the contractor to pipe away from the system. The first compartment (trash trap tank) shall be covered and include a 24" diameter access manway and 3"sludge drawoff with ball valve. The wastewater treatment system shall be placed on a concrete slab at the proper elevation per the drawings.

The tank shall be fabricated out of ¼" structural grade steel plate (ASTM A-569), joined by arc welding with fillets of adequate section inside and out for the joint involved. All walls shall be continuous and watertight and shall be supported by structural reinforcing members where required. The tank shall have reinforcing members on 5' maximum spacing. The entire tank shall be sand blasted to SSPC-SP 6 and 10 with a finish coat of coal tar epoxy inside and out to 8 to 10 mils thickness.

All in-basin piping, valving and supports shall come pre-installed and ready for hook-up by the contractor.

An independent influent control sequence will be used for proper operation. The tank is sent into a timed settle period when a predetermined level is reached. After the settle period ends, the decant is energized, the decant continues until the tank reaches the bottom water level (BWL). Once BWL is reached, the tank returns to the fill cycle.

During the fill and interact cycle there shall be static, and aerobic sub cycles. The sub-cycles shall repeat all during the fill and interact cycle. This feature shall allow the operator to optimize aeration.

General

The Contractor shall have one supplier furnish and deliver the system complete in all details and in strict accordance with the plans and specifications. All equipment within the treatment basins shall be capable

of full operation under completely flooded conditions. General equipment performance requirements are as follows:

INFLUENT WASTEWATER CHARACTERISTICS AND SITE CONDITIONS

Average Dry Weather Flow (ADWF). . . . . ADWF MGD

Peak Flow . . . . . PDWF MGD

Peak Instantaneous Flow. . . . . PIF GPM

BOD (5 Day-20° C) . . . . . BODin mg/l

Suspended Solids . . . . . TSSin mg/l

TKN . . . . . TKNin mg/l

Temperature Range (Water) . . . . . MIN° C to MAX° C

Temperature Range (Air) . . . . . MIN° F to MAX° F

Site Elevation . . . . . ELEV ft. MSL

EFFLUENT REQUIREMENTS

BOD_5 . . . . . BODef mg/l

Suspended Solids . . . . . TSSef mg/l

NH_3-N . . . . . NH3ef mg/l

Total Nitrogen. . . . . TNef mg/l

The SBR Equipment Supplier shall guarantee system performance and supply any added equipment including pump and/or blower capacity beyond the minimum specified performance requirements.

JET AERATION (ASPIRATING) SYSTEM:

The equipment shall consist of a diffuser assembly and pump for subsurface operation. Two units shall be supplied to provide 100% standby. Each unit shall be a Model Model designed to transfer the required oxygen per hour to the wastewater at the design depth using atmospheric air provided to the diffuser by an air supply pipe. The pump shall draw liquid from the basin to provide a motive fluid for operation of diffuser.

The diffuser shall consist of a precision formed, fiberglass, tubular nozzle designed for optimum performance under the conditions specified. The diffuser shall be connected to the pump discharge piping with FRP flanges using stainless steel bolts.

SUBMERSIBLE MOTIVE LIQUID PUMPS

The jet motive liquid pumps shall be submersible non-clog sewage pumps capable of being used for jet aeration. An adequate length of Hypalon Jacketed Type SPL cable suitable for submersible pump applications shall be supplied. Each unit shall be provided with the required length of lifting chain of adequate strength to permit raising and lowering the pumps.

IMPELLER The impeller shall be dynamically balanced non-clogging type made of close-grained cast iron conforming to ASTM A48 Class 30. The impeller shall be of one piece, single suction, enclosed,

radial flow design with well-rounded leading vanes and tapered toward the trailing edge for a circular flow pattern. The waterways through the impeller will have extremely smooth contours, devoid of sharp corners, so as to prevent rags or stringy, fibrous material from catching or clogging. The clearance between the impeller outside diameter and cutwater shall be capable of passing a minimum Diameter inch sphere. The impeller is to be statically balanced and secured by means of a bolt, washer, and key. The arrangement shall be such that the impeller cannot be loosened from torque in either forward or reverse rotation. Wiper vanes on the back impeller shroud are not allowed.

VOLUTE AND SLIDING BRACKET The volute shall be matched to the impeller and made of close-grained cast iron conforming to ASTM A-48 Class 30. The volute is to be of one-piece circular constant flow, equalizing pressure design with smooth fluid passages large enough to pass any size solid that can pass through the impeller. The volute shall be side flanged tangential discharge. The volute shall be furnished with large clean-out openings located at the impeller centerline, to allow access to the impeller. The sliding bracket assembly shall be a part of the pumping unit constructed so that when lowered onto the straight thru discharge base, the knifing of the vertical metal-to-metal seal provides a self cleaning, non-clogging, UL listed non sparking assembly. Two guide rails shall be included.

GUIDE RAIL /BRACKET Guide rails shall be provided on which the pump rides when being raised or lowered in the basin. Guide rails shall mount on the straight thru discharge base. The rails shall align the pump with the straight thru discharge base as it is lowered into place. An upper guide rail bracket shall be provided to support and align the rails at the top of the basin.

DISCHARGE BASE The discharge base shall be permanently installed in the SBR Basin along with the discharge piping. The pumps shall be automatically connected to the discharge connection when lowered into place, and shall be easily removed for inspection or service. Sealing of the pumping unit to the discharge connection shall be accomplished by a simple linear downward motion of the pump. A sliding guide bracket shall be an integral part of the pump unit. The entire weight of the pumping unit shall be guided by no less than two guide. The pump, with its appurtenances and cable, shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet. The base shall connect to the discharge piping with a 125 lb. ANSI flange.

SUBMERSIBLE MOTOR Each submersible solids handling pump shall be driven by a completely sealed, electric submersible squirrel cage induction motor of Hp Hp, 1.15 service factor, RPM RPM, 460 volts, 3 phase, 60 Hz power. The motor nameplate horsepower rating shall not be exceeded by the brake horsepower requirements of the specified head and capacity conditions.

The submersible motor shall be UL listed for Class 1, Division 1, Group C and D explosion-proof hazardous locations as defined by the air filled cast-iron, water-tight enclosure which is sealed by the use of O-rings and shall have rabbit joints with an extra large overlap.

The stator winding and lead shall be insulated with moisture resistant Class F insulation for continuous duty in 40° C rise liquids. The motor shall be designed for continuous duty capable of a minimum of ten (10) starts per hour. At the design point the motor shall draw not more than BHp Hp at rated voltage. Motor shaft shall be 416 stainless steel; the rotor is to be dynamically balanced to meet NEMA vibration limits; all hardware shall be stainless steel. Cable leads shall allow the connection of a cable to the motor in the field without soldering. All leads are to be sealed and designed to prevent cable wicking to conduit box located on top of the motor.

SEALS Each pump shall be provided with a tandem mechanical seal system. The mechanical seal chamber shall be oil filled and equipped with a moisture detection device wired internally to the control cable. Each seal shall be held in contact by its own spring system, and shall require neither maintenance not adjustment, but shall be easily inspected and replaceable. The lower seal shall include a protective cup to prevent solids or stringy material from lodging in the seal spring.

BEARINGS The pump shall rotate on a minimum of two bearings permanently lubricated, but capable of

being regreased, suitable for a minimum L10 bearing life of 40,000 hours. Lifting lugs shall be supplied on the motor, sufficient to carry the load of the motor, pump, cable and pull-up attachment. All mating surfaces shall be machined and fitted and sealed with O-rings. Fittings shall be accomplished by metal-to-metal contact between each machine surface, resulting in controlled compression of O-rings without requirement of a specific torque limit. No secondary sealing compound shall be used.

QUALITY ASSURANCE Pumps are to be engineered and manufactured under a written Quality Assurance program. The Quality Assurance program is to be in effect for at least five (5) years, to include a written record of periodic internal and external audits to confirm compliance with such program.

JET MOTIVE LIQUID PUMP CHARACTERISTICS:

Quantity: Number () Flow GPM at TDH ft. TDH, BHp BHP Maximum

SUPPORTS:

All necessary supports for the in basin equipment shall be supplied as part of the system. The supports shall be manufactured of stainless steel.

SBR DECANT EQUIPMENT:

The decanter shall be a stationary decanter of the solids excluding type which prevents solids from accumulating in the decanter header.

The decanter shall be constructed of fiberglass reinforced polyester (FRP) fabricated in complete compliance with PS 15-69 and coated with gelcoat for ultra-violet protection, with a minimum wall thickness of 3/16", or 304 stainless steel.

The decanter shall be capable of decanting Batch gallons of supernatant within a Dec.Time minute period. Maximum withdrawal rate shall not exceed 100 gpm/foot of collector length.

The decanter shall be air operated so as to exclude mixed liquor solids and liquid from entering the decanter during the aerated and/or mixed segments of the SBR operating cycle. The decanter shall be Fluidyne Model Model as manufactured by Fluidyne Corporation, Cedar Falls, Iowa.

All mounting brackets and hardware shall be provided by the Supplier. Hardware shall be stainless steel. Mounting brackets shall be ¼ inch stainless steel.

A one (1) inch decant vent valve for automatic decant shall be provided. It shall be housed in a Nema 4 enclosure with thermostatically controlled heater.

Furnish one Size inch diameter electrically operated butterfly valve to control the decant rate. Valve shall be BAW AWWA C-504 Class 1508 butterfly valve with ANSI Class 1 25 flanged end ASTM A-1 26 Class 6 cast iron body. EPDM seat, cast iron disk with 31 6 stainless steel edge, 304 stainless steel shaft assembled and tested with a 460 volt, 3 phase, 60 cycle open/close service electric actuator. Valve actuator shall include a compartment heater. Each valve shall include manual override with limit switch feedback to the micro-processor in both the open and closed positions. Electrical wiring of the valve shall be in accordance with NEC code requirements.

SBR OVERFLOW WEIR/ SKUM SKIMMER:

A steel overflow weir shall be provided to allow flow from the SBR compartment to overflow back to the influent equalization tank during the interact cycle. The weir shall also provide scum skimming of the SBR portion of the tank. The weir shall also provide flow diffusion during periods of high flow. The entire weir shall be to the steel tank, sand blasted and finished to the specifications as the tank.

WASTE SLUDGE MECHANISM:

A waste sludge mechanism shall be supplied including all piping, valving and supports. Each jet motive pump shall be equipped with a sludge bleed line to allow wasting of sludge back to the trash trap. A 1 ½" manual ball valve shall be included on each line.

CONTROL PANEL

The control panel shall be metal enclosed indoor-type and meet the requirements of NEMA Enclosure Type 1. The panel shall be designed, manufactured, and tested in accordance with the latest applicable standards.

The cycle drives and sequences for the SBR's shall be controlled by an industrial grade programmable controller. The PLC's shall be housed in the control panel supplied by the SBR manufacturer to provide unit responsibility. The control panel shall be shipped completely factory wired, assembled and factory tested simulating all inputs and outputs.

Switches and lights shall be supplied to operate all electric valves, mode selection, and cycle indication in both manual mode and automatic mode. All lights and switches shall be industrial grade, oil tight Square D or equal.

The PLC shall contain a central processing unit, a CMOS RAM memory power supply, inputs and outputs. The unit shall have five diagnostic indicators; PC Run, Communication, CPU Fault, Forced 1/0 and battery Low. The unit shall have a 16K-word user memory contained within CMOS RAM with capacitor and battery back up capable of 2 to 3 year memories back up. The unit shall be equipped with removable EEPROM non-volatile memory back up. The processor shall be an Allan Bradley SLC5/03.

Expansion units to provide additional input and output capacity shall be provided as required.

Each PLC unit shall be provided with a Data Table Access Module DTAM mounted on the front of the control panel. The DTAM shall have a key switch to allow the operator to monitor or modify the timer-counter set points. The unit shall have a two-line character supertwist nematic LCD with LED backlit display. The keyboard shall be a 9-place pressure sensitive keyboard to access and enter data and addresses.

The control system shall provide automatic sequence of the SBR's tanks.

SBR LEVEL CONTROLS:

Tank level controls shall be of a non-invasive type suitable for the intended purpose in a hostile environment. Each detector shall be independently adjustable and provide a distant signal at the selected level. Level sensors shall have a load capability of 5 A each 117 VA. The level sensor shall be of the weighted suspended float type suitable for use in sewage.

A separate float or level sensor shall be supplied for proper operation of the SBR and the equalization tanks. A 304 stainless steel bracket shall be included to position the floats at the correct level.

Each equalization tank shall be provided with three floats:

Low Water Level –

Mid Water Level –

High Water Level –

Each SBR tank shall be equipped with two floats:

Bottom Water Level –

Top Water Level –

OTHER SERVICE AND EQUIPMENT:

The installing contractor shall perform the following:

1. Field unloading and setting of the system on the foundation pad and anchoring in position.
2. Assemble into position, at the location shown on the plant, the ancillary equipment that has been disconnected at the factory for shipping purposes.
3. Interconnection of piping and wiring which may have been disconnected at the factory for shipping purposes.
4. Tie-in of all piping, power and wiring connection to site utilities. The power required at the main power supply is 460 volt, 3 phase, 60 Hz.
5. Furnish foundation pad upon which to set the system.
6. Place tankage square on pad, Crane capacity of Capacity pounds minimum.
7. Touch-up painting of areas damaged during installation.
8. Filling tank to the proper level to prevent flotation.
9. Any remote panels or disconnects required for local codes or to meet job requirements.

FIELD SERVICE AND TRAINING:

The Contractor shall provide the services of a factory trained Engineer who has at least three years factory experience in jet aeration equipment. The factory engineer shall be qualified to supervise installation, test for proper installation, conduct start-up, and train operator in the operation of the equipment and the process. A minimum of Hours (#) hours on the job site in a minimum of Trips (#) trips shall be provided.

APPENDIX D

CONCEPTUAL SITE PLAN FOR NEW SBR PLANT

EXHIBIT 3

Bellemeade PER

PRELIMINARY ENGINEERING REPORT

MIDLANDS UTILITY, INC.

BELLEMEADE SUBDIVISION

WASTEWATER TREATMENT PLANT REPLACEMENT

MIDLANDS UTILITY, INC.

Prepared for:
Midlands Utility, Inc.
816 East Main Street
Lexington, South Carolina 29072

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WASTEWATER TREATMENT PLANT REPLACEMENT

Prepared for:
Midlands Utility, Inc.
816 East Main Street
Lexington, South Carolina 29072

Prepared by:
HPG and Company, Consulting Engineers, Inc.
1432 Sunset Boulevard
West Columbia, South Carolina 29169
HPG File No. 99074

January, 2005

TABLE OF CONTENTS

I INTRODUCTION

A. GENERAL

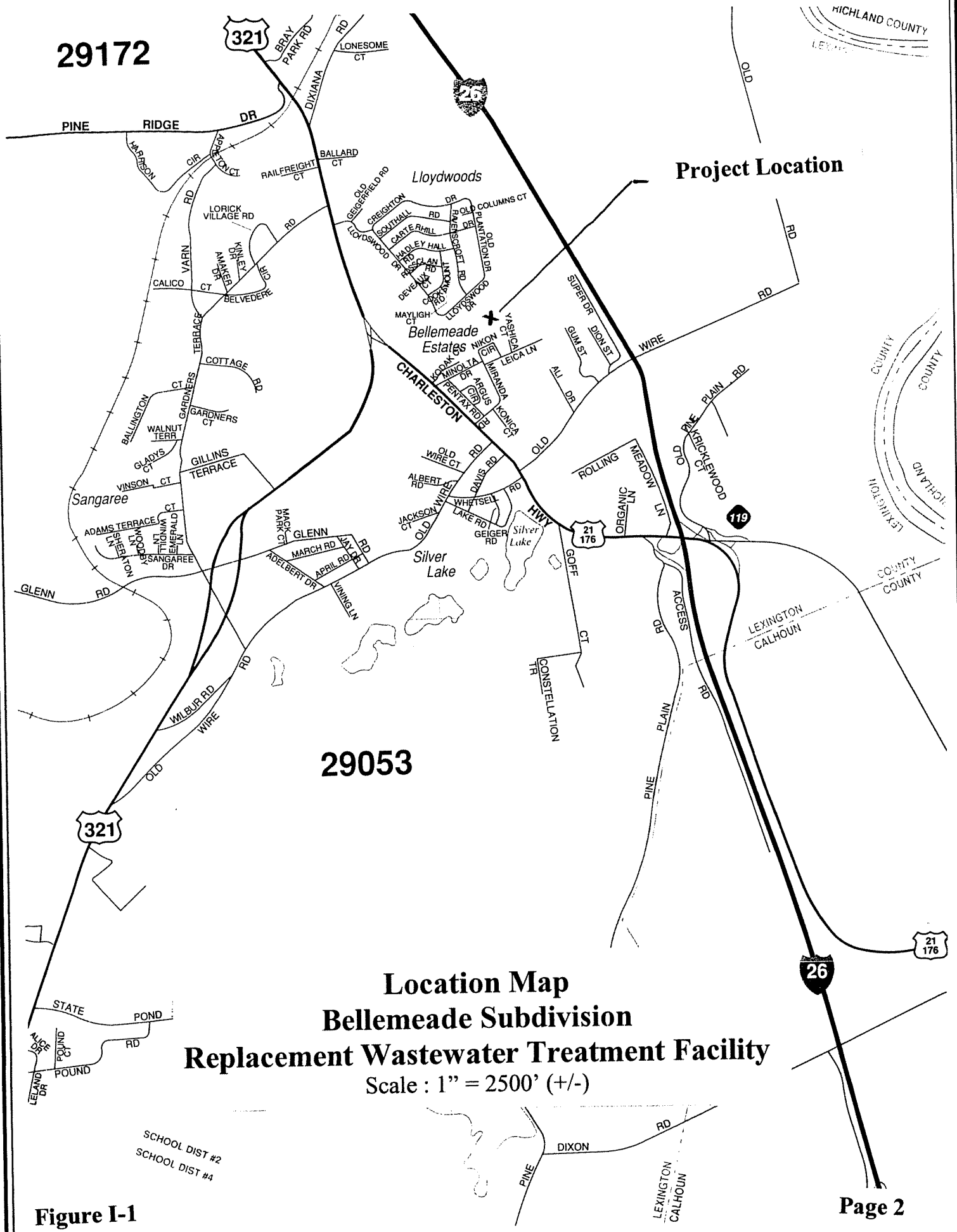
Midlands Utility is a privately owned, public utility which owns, operates and maintains a number of wastewater collection and treatment facilities within Fairfield, Orangeburg, Richland and Lexington Counties. One of these facilities serves a subdivision southeast of Columbia in the Cayce / Dixianna area. This subdivision is known as the Bellemeade Subdivision. This particular collection and treatment system provides wastewater service for approximately 160 residences and a truck stop / restaurant at I-26 and US 176. A location map is provided in Figure I-1 showing the location of this particular facility.

B. CONTACTS

The various contacts for this project are as follows:

Owner: Midlands Utility, Inc.
816 East Main Street
Lexington, South Carolina 29072
Contacts: Keith G. Parnell, P.E., President
Telephone: (803) 359-4803
Facsimile: (803) 359-2374

Engineer: HPG and Company, Consulting Engineers, Inc.
1432 Sunset Boulevard
West Columbia, South Carolina 29169
Contacts: Charles K. Parnell, P.E.
Telephone: (803) 739-2888
Facsimile: (803) 739-2277



Location Map
Bellemeade Subdivision
Replacement Wastewater Treatment Facility

Scale : 1" = 2500' (+/-)

Figure I-1

C. PURPOSE / PROJECT NEED

This facility from time to time violates some parameters of the NPDES discharge permit. The violations include exceedence of biochemical oxygen demand (BOD_5), ammonia nitrogen, ph, total residual chlorine, dissolved oxygen and fecal coliform. The facility consist of two aerated lagoons and realistically can not perform day in and day out to produce an effluent meeting the requirements of the current NPDES permit. Some excursions occur (specifically ammonia nitrogen) due to the nature and lack of process controls associated with a lagoon system.

Midlands Utility has entered into a Consent Order (03-044-W) (see Appendix A) with the SC Department of Health and Environmental Control to deal with options of either tying the system onto the city of Cayce and eliminating the facility or upgrading the facility with a new advanced treatment process.

D. CONSENT ORDER REQUIREMENTS

As discussed in the previous section, a consent order was entered into on April 4, 2003 between SCDHEC and Midlands Utility, the consent order identifies two paths for compliance. The first is the requirement to submit a contract between Midlands Utility and the city of Cayce for wholesale treatment with facility elimination to the SC Public Service Commission (PSC) for their denial or approval. A contract was submitted to the PSC on August 23, 2004 which was denied by the PSC due to the cost of service from the city of Cayce. The PSC ruling is contained in Appendix B.

The second path of actions resulting from the denial of a wholesale treatment contract requires the construction of a replacement wastewater treatment facility. This Preliminary Engineering Report provides compliance with the consent order requirements.

TABLE I.I
CONSENT ORDER
COMPLIANCE SCHEDULE

Description			*Date*
1.	Date of Consent Order		April 7, 2003
2.	Submit city of Cayce contract to PSC		60 days June 6, 2003
3.	If PSC approves contract		
	3a.	Submit plans and specifications for connection (also lagoon closure plan)	60 days from PSC order
	3b.	Begin construction	45 days from permit issuance
	3c.	Make operational	120 days from beginning construction
	3d.	Close-out lagoon	180 days from operating permit
4.	If PSC denies contract		
	4a.	Submit PER for WWTF upgrade	60 days of PSC's order
	4b.	Submit plans and specifications for WWTF	60 days after PER approval
	4c.	Begin construction	90 days after permit issuance
	4d.	Make operational	210 days after beginning construction
	4e.	Lagoon close-out	No date

II EXISTING FACILITY EVALUATION

A. NPDES PERMIT

Midlands Utility does have an active NPDES permit for this facility, SC0030988. The limits of this permit are listed in the following Table II.1.

TABLE II.I
NPDES PERMIT LIMITS
(SC0030988)

Parameter	*Concentration*
Dissolved Oxygen	5.0 min., instantaneous
BOD_5	30 mg/l (monthly average) 45 mg/l (weekly average)
pH	6.0 - 8.5 std. Units
Total Suspended Solids	90 mg/l (monthly average) 135 mg/l (weekly average)
Flow	0.080 MGD
Total Nitrogen	monitor and report
Total Residual Chlorine	0.025 mg/l (monthly average) 0.044 mg/l (daily maximum)
Fecal Coliform	200# per 100 ml (monthly average) 400# per 100 ml (daily maximum)
Ammonia-Nitrogen (Winter)	9.59 (monthly average) 14.39 (weekly average)
Ammonia-Nitrogen (Summer)	4.97 (monthly average) 7.46 (weekly average)
Total Phosphorous	monitor and report

B. HISTORICAL PERFORMANCE OF FACILITY

Midlands Utility, through their laboratory, samples and tests for the parameters shown in Table II.1. The following, Table II.2 shows discharge parameter data for the past twelve months as shown on the discharge monitoring reports (DMR).

TABLE II.2
LABORATORY DATA

Month	*BOD*	*TSS*	*DO*	pH	Total Nitrogen	Ammonia Nitrogen	Total Phosphorous	Total Residual Chlorine	Fecal Coliform
January, 2004	23	12	5.3	6.4 - 8.4	26.3	10.01	1.8	0.00	<4
February, 2004	28	21.5	5.2	6.6 - 8.4	37.1	14.75	2.3	0.00	<2
March, 2004	12	16	5.0	6.5 - 10.4	24.2	7.3	0.7	0.02	5.8
April, 2004	23.5	42	5.1	6.3 - 8.9	24.1	7.95	1.7	0.00	<2
May, 2004	22	22.5	5.3	6.3 - 8.4	14.9	3.3	3.3	<0.02	<4
June, 2004	26.5	58.5	2.9	6.3 - 8.3	28.7	7.9	1.7	0.00	<2
July, 2004	26.5	23	5.1	6.2 - 8.3	10.6	2.5	3.2	0.00	<2.8
August, 2004	23.5	19.9	5.0	6.1 - 8.4	10.5	2.75	1.1	0.00	<4
September, 2004	21	21.5	5.0	6.1 - 8.4	17.6	7.2	1.9	0.00	7.9
October, 2004	26	29.5	5.1	6.1 - 8.4	20.0	6.2	1.8	0.00	<4
November, 2004	28	20	5.1	6.1 - 7.3	18.3	4.4	0.9	0.00	555.6
December, 2004	19.5	16.5	5.1	6.1 - 6.8	14.5	5.2	1.8	0.00	202

pH expressed in standard units.
All other units expressed as milligrams per liter.
Noted in this table are monthly averages.

Table II.3 which presents flow data for the plant over the past twelve months. Also presented is data showing a ratio of actual flow to allowable flow each month.

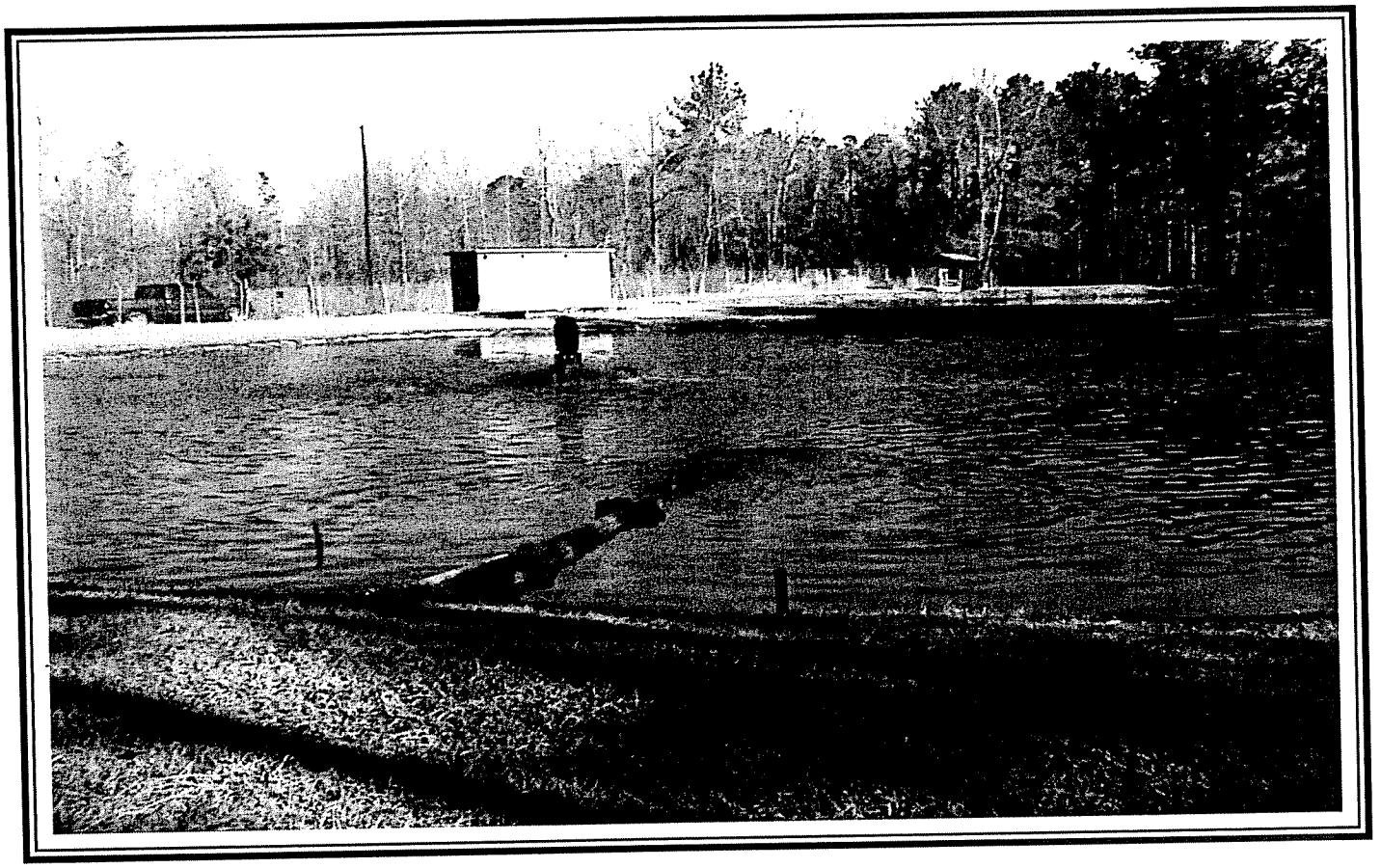
TABLE II.3
FLOW DATA

Month	*Flow*
January, 2004	0.054
February, 2004	0.053
March, 2004	0.044
April, 2004	0.040
May, 2004	0.035
June, 2004	0.033
July, 2004	0.033
August, 2004	0.033
September, 2004	0.035
October, 2004	0.043
November, 2004	0.034
December, 2004	0.046

Flow expressed as MGD

C. LAGOON SYSTEM

The treatment facility is comprised of one aerated lagoon and a polishing pond. Lagoon No. 1 has a single 20 hp surface aerator. Flow enters the first lagoon (in the foreground photograph) and exits right of the polishing poind in the background of the photograph. Flow travels from aerated lagoon No. 1 to a second aerated lagoon / polishing pond (photograph C.2). Flow from the polishing pond then exits the polishing pond and flows to the chlorine contact effluent metering chamber. Discharge is to a nearby creek..

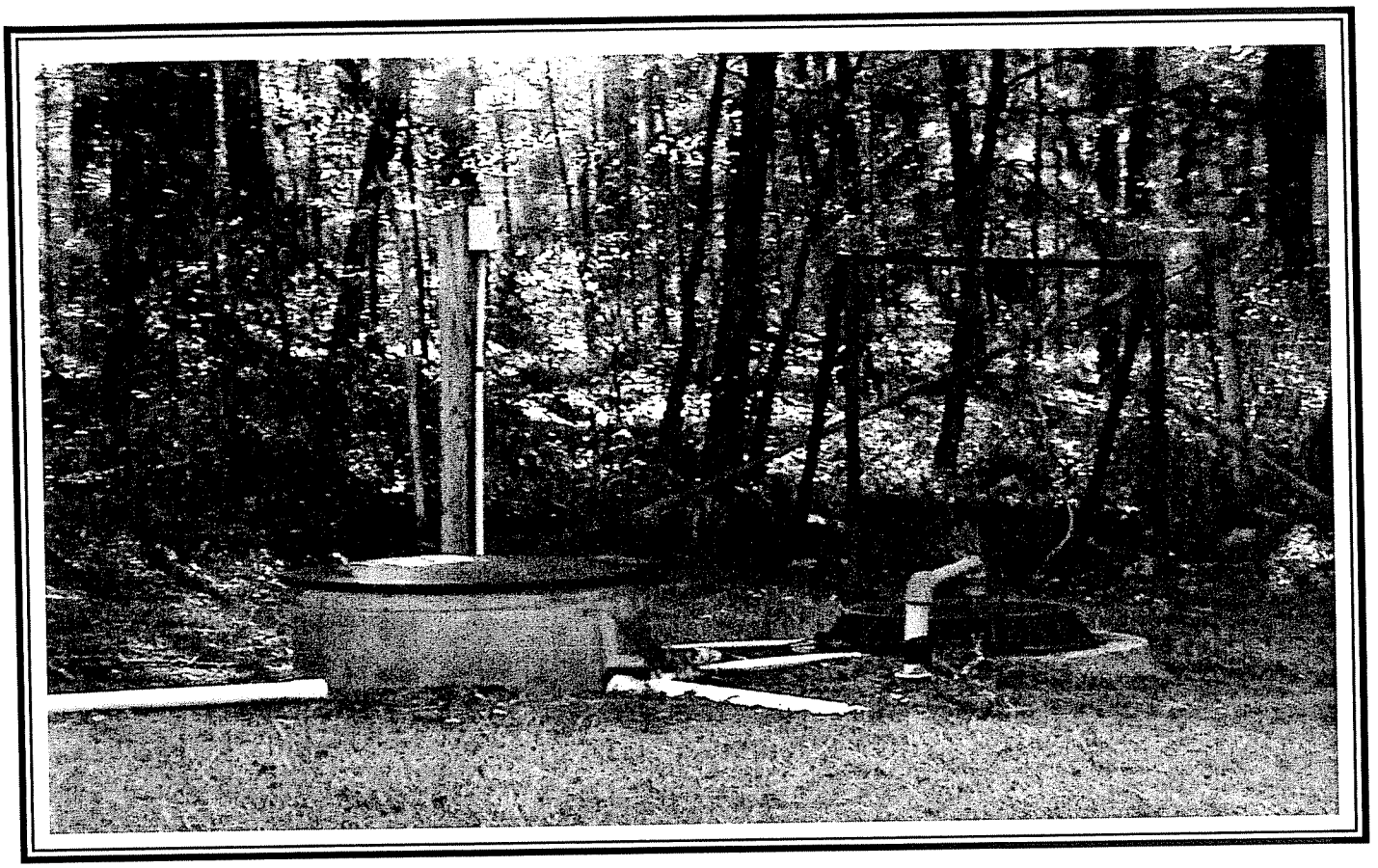


Photograph C. 1

Shown in this photograph is the aerated lagoon in the foreground. The lagoon contains one 20 hp aerator. Flow enters the lagoon from the bottom left corner of the photograph and exits the lagoon at the top right corner to the polishing pond. The entire site is fenced for security.

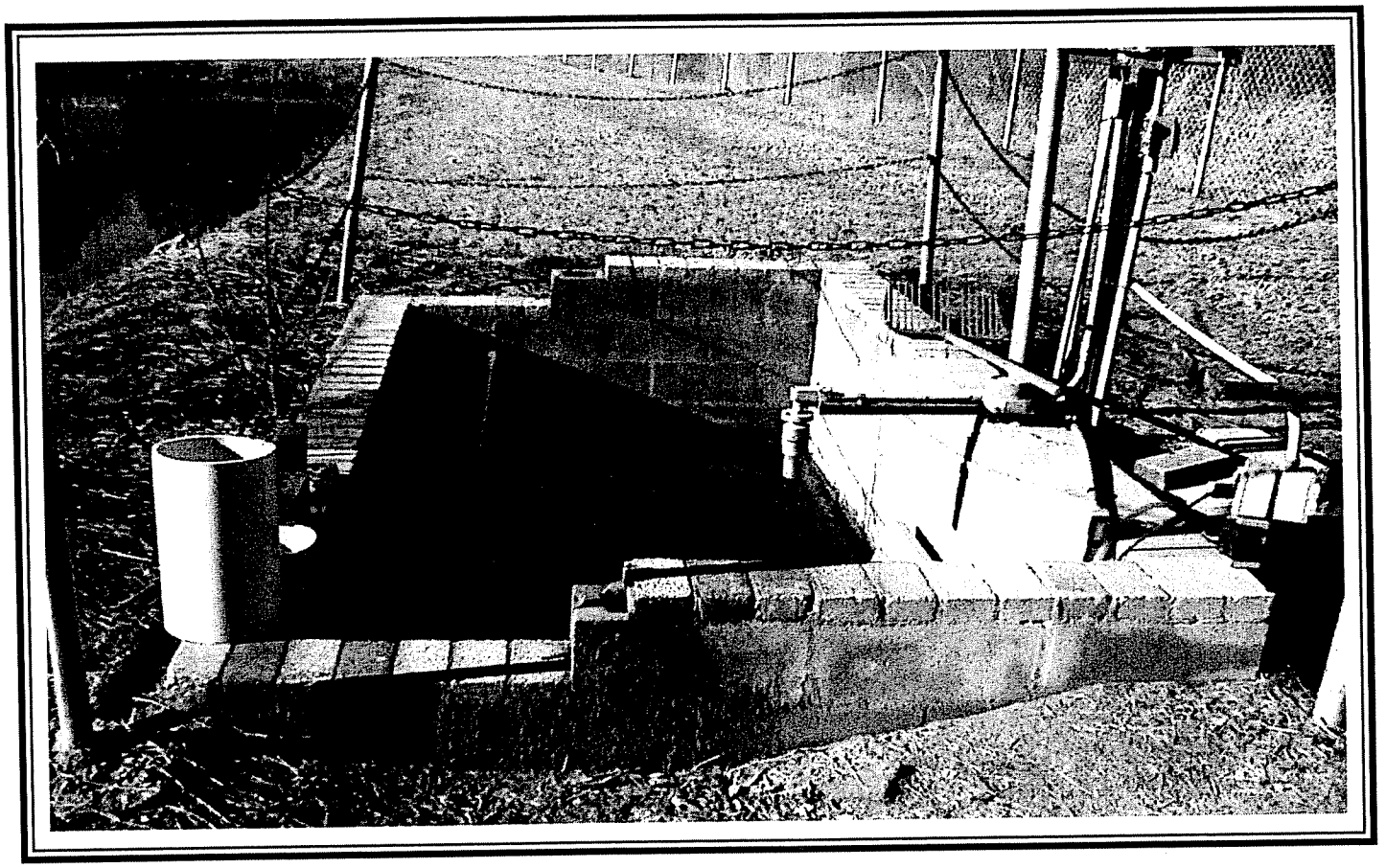
Photograph C. 2

Shown in this photograph is the polishing pond in the background. Flow enters the pond from the left of the photograph, and then travels through the pond. The building in the background is the chlorine building which houses the feed equipment. The concrete structure to the right of the building is the chlorine contact chamber. The piping shown connects the effluent from the polishing pond to the chlorine contact chamber.



Photograph C. 3

Shown in this photograph is the influent pump station and receiving manhole. This pump station discharges through a force main into the aerated lagoon.



Photograph C. 4

Shown in this photograph is the chlorine contact chamber. Flow enters the basin from top left, flows around the baffles and exits to the bottom right for final discharge

III PROPOSED TREATMENT FACILITY

A. GENERAL

The proposed replacement plant will be a sequencing batch reactor (SBR) designed at not less than 80,000 gallons per day, the SBR will be capable of treatment levels of 10/10/1 (BOD_5 / TSS / NH_3-N), far superior to that of the existing aerated lagoon system. The current NPDES discharge limits for this facility is as follows:

Table III.I
Current NPDES Discharge Limits

Parameter	*Concentration*
Dissolved Oxygen	5.0 min., instantaneous
BOD_5	30 mg/l (monthly average) 45 mg/l (weekly average)
pH	6.0 - 8.5 std. Units
Total Suspended Solids	90 mg/l (monthly average) 135 mg/l (weekly average)
Flow	0.080 MGD
Total Nitrogen	monitor and report
Total Residual Chlorine	0.025 mg/l (monthly average) 0.044 mg/l (daily maximum)
Fecal Coliform	200# per 100 ml (monthly average) 400# per 100 ml (daily maximum)
Ammonia-Nitrogen (Winter)	9.59 (monthly average) 14.39 (weekly average)
Ammonia-Nitrogen (Summer	4.97 (monthly average) 7.46 (weekly average)
Total Phosphorous	monitor and report

It is anticipated that the TSS limits may change as a result of an alternative process selection. That change has been anticipated in the SBR process selection.

B. PROPOSED PLANT CONFIGURATION

The new plant will consist of the following units of operations:

- Influent pumping (existing)
- Mechanical screening
- Manual standby screening
- Dual train sequencing batch reactor basins, Including:
  - Sludge storage
  - Anoxic zone
  - SBR reactor basin
- Controls
- Post SBR equalization with controlled peak rate discharge
- Dual UV disinfection
- Post, flow monitoring
- Discharge (utilization of existing)
- Standby power

C. INFLUENT WASTEWATER CHARACTERISTICS

The waste stream to this facility is typical domestic, generated by primarily residential users. There are no industrial users of the system. The system serves one commercial business and a truck stop at I-26. The truck stop does have a restaurant which also discharges to this system. The wastewater delivered to this facility is believed to have the following generalized characteristics:

Table III.2
Influent Wastewater Characteristics

Average flow	80,000 gpd
Peak flow	200,000 gpd
BOD_5 (20° C)	220 mg/l
BOD_5 (20° C)	145 lbs/ day
Suspended solids	220 mg/l
NH_3 - N	40 mg/l
Alkalinity	150 mg/l
Wastewater temperature	20° C
Ambient air temperature	20 - 90° F
Site elevation	200 ft.

D. DESIGN EFFLUENT QUALITY

Although the current NPDES permit discharge limits are not particularly stringent, it is believed to be remiss not to design an advanced wastewater treatment facility. The selection of an advanced process is of particular importance when considering the ammonia limits which this discharge will have to meet and the potential future phosphorous limits which may be imposed.

Table III.3
Effluent Quality
(Average Monthly)

BOD_5 (20°c)	< 10 mg/l
Total suspended solids	< 10 mg/l
NH_3 - N	< 1.00 mg/l

E. PLANT RELIABILITY

Based on the standards for wastewater facility construction , it is anticipated that this facility will be required to comply with a class II reliability. To achieve class II reliability, the following will be incorporated into the facility design.

- Standby / auxiliary power will be provided to operate the facility in case of power outage.
- Dual SBR trains will be installed.
- One mechanical bar screen will be installed along with a manual cleaned back-up screen.
- All pumps in the system will be duplicated with capacity of each capable of handling the average flow. Not less than 2 units will be provided.
- Each SBR train will have an independent clarification sequence.
- The dual SBR trains will each have a capacity equal to one half of the total design capacity of the entire facility.
- Aeration blowers/pumps will have identical back-up units, each capable of supplying aeration for the entire treatment train. Not less than 2 units will be provided.
- Dual disinfection units will be provided each capable of treating the entire facility.

F. SBR DESIGN CRITERIA

The sequencing batch reactor process is chosen as the proposed method to provide a high level of treatment prior to discharge. The SBR will be provided as two independent treatment trains, each designed for one-half the total plant design flow but each capable of handling the entire plant design flow. The process will be divided into the following treatment components:

- Screening
- Influent pumping pre-reactor (existing pump station)
- Anaerobic zone / sludge storage.
- Anoxic zone, with influent equalization.
- SBR zone with aeration and mixing
- Decanter
- Post SBR flow equalization with constant rate discharge device
- Dual ultraviolet light disinfection
- Effluent flow metering
- Discharge (existing discharge location)

Complete design calculations for the process are contained in Appendix D of this report.

G. SLUDGE HANDLING

The existing facility has no sludge handling or dewatering facilities. The selected process has sludge storage in excess of 60 days at design treatment rates. The utility has a tanker which will be utilized to transport the sludge to the Bush River Facility for dewatering or treatment and disposal at other approved disposal sites (i.e. Bio-Tech). No separate sludge treatment / dewatering will be provided.

H. COST ESTIMATE

The new plant will be constructed on the existing plant site. The estimated cost for this work is itemized in the following table.

Table III.4
SBR Plant Construction

Item	*Description*	*Cost*
1.	Influent pump station (pump modifications)	$ 25,000.00
2.	New bar screen, structure and equipment	25,000.00
3.	SBR equipment with tankage	250,000.00
4.	SBR equipment installation	10,000.00
5.	Concrete foundation	25,000.00
6.	Electrical	20,000.00
7.	Piping	15,000.00
8.	Generation / transfer switch	25,000.00
9.	UV Disinfection equipment and installation	25,000.00
10.	Effluent Metering	5,000.00
	Total Construction	$ 425,000.00
	Engineering	40,000.00
	Contingencies	40,000.00
	Total Project Cost	$ 505,000.00

I. IMPLEMENTATION SCHEDULE

To construct the new facility, the following schedule is proposed. This schedule is obviously contingent on the review and approval periods. The actual on-line date will be affected by these.

Submit Preliminary Engineering Report	February 01, 2005
Approve Preliminary Engineering Report	May 01, 2005
Submit Construction Drawings	July 01, 2005
Approve Construction Drawings	October 01, 2005
Begin Construction	December 01, 2005
End Construction	July 01, 2006
Place System in Operation (final SCDHEC approval)	July 01, 2006

APPENDIX A

SCDHEC CONSENT ORDER

THE STATE OF SOUTH CAROLINA
BEFORE THE DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

IN RE: MIDLANDS UTILITY, INC.
BELLEMEADE SUBDIVISION
LEXINGTON COUNTY

CONSENT ORDER
03-044-W

Midlands Utility, Inc. (Respondent) owns and is responsible for the proper operation and maintenance of a wastewater treatment facility (WWTF) serving the residents in and contiguous to Bellemeade Subdivision and the Pitt Stop Truck Stop located in Lexington County, South Carolina.

The Respondent violated the Pollution Control Act, S.C. Code Ann. §§ 48-1-10 et seq. (1987 & Supp. 2002) and National Pollutant Discharge Elimination System (NPDES) Permit SC0030988 in that it exceeded the permitted discharge limits for ammonia-nitrogen (NH_3-N), biochemical oxygen demand (BOD), dissolved oxygen (DO), fecal coliform bacteria (FC), pH and total residual chlorine (TRC), as specified in Part I.A.1 of the NPDES permit.

In accordance with approved procedures and based on discussion with the Respondent on March 27, 2003, the parties have agreed to the issuance of this Order to include the following Findings of Fact and Conclusions of Law.

In the interest of resolving this matter without delay and expense of litigation the Respondent agrees to the entry of this Consent Order, but neither agrees nor disagrees with the Findings of Fact or the Conclusions of Law; and therefore, agrees that this Order shall be deemed an admission of fact and law only as necessary for enforcement of this Order by the Department or subsequent actions relating to the Respondent by the Department.

FINDINGS OF FACT

1. NPDES Permit SC0030988 allows the Respondent to discharge treated wastewater to a ditch to Dry Creek to the Congaree River in accordance with the effluent limitations, monitoring requirements and other conditions set forth therein. The permit expired September 30, 2000. The permit was not reissued due to the designation of the WWTF for elimination by the area-wide 208 plan.

2. Since the expiration of the permit, the Respondent has continued to submit monthly discharge monitoring reports (DMRs) and annual NPDES permitting fees to the Department and otherwise treated the expired permit as continuing to be in effect. The Department has accepted these DMRs and permitting fees.

3. Department staff performed a Compliance Sampling Inspection (CSI) at the Respondent's WWTF on October 8, 2001. Department staff rated the WWTF noncompliant as a result of violations of the permitted discharge limits for NH_3-N, FC and pH.

4. Department staff performed a CSI at the Respondent's WWTF on April 15, 2002. Department staff rated the WWTF noncompliant as a result of violations of the permitted discharge limit for FC.

5. On April 30, 2002, the Department issued a Notice of Violation to the Respondent as a result of violations of the permitted discharge limits for NH_3-N and BOD during the February 1, 2002, through March 31, 2002, monitoring periods. In a letter dated May 15, 2002, the Respondent's agent replied to the NOV, stating that it had submitted a proposal to a regional sewer provider and was awaiting a response.

6. A review of DMRs submitted by the Respondent for the September 1, 2000, through December 31, 2002, monitoring period has revealed the following violations of the permitted discharge limits:

NH_3-N - September, October, November and December 2000, January, February, March, April, May, June, July, September, October, November and December 2001, and February, March, April, May, June, July, August, October, November and December 2002;

BOD - September, October and November 2000, February, April, May, June July and November 2001, and February and March 2002;

DO - December 2000, January, July, September, October and November 2001, and July and September 2002;

FC - October and December 2000, August and December 2001, and April 2002;

pH - February and May 2002; and

TRC - September, October, November and December 2000, January, February, March, April, May, June, July, September, October, November and December 2001, and March, July and November 2002.

7. The Respondent is a public utility regulated by the South Carolina Public Service Commission (PSC).

8. PSC Regulation R.103-541 provides for PSC approval of all utility contracts including connection agreements by sewer systems with a regional provider.

CONCLUSIONS OF LAW

Based upon the above Findings of Fact, the Department reaches the following Conclusions of Law:

1. The Respondent violated the Pollution Control Act, S.C. Code Ann. § 48-1-110 (d) (Supp. 2002), and Water Pollution Control Permits, 24 S.C. Code Ann. Regs. 61-9.122.41(a)(1) (Supp. 2002), in that it failed to comply with the permitted discharge limits for NH_3-N, BOD, DO, FC, pH and TRC as specified in Part I.A.1 of the NPDES permit.

2. The Pollution Control Act, S.C. Code Ann. § 48-1-330 (1987), provides for a civil penalty not to exceed ten thousand dollars ($10,000.00) per day of violation for any person violating the

Act or any rule, regulation, permit, permit condition, final determination, or Order of the Department.

NOW, THEREFORE, IT IS ORDERED, pursuant to the Pollution Control Act, S.C. Code Ann. 48-1-50 (1987) and § 48-1-100 (Supp. 2002), that the Respondent shall:

1. If, within thirty (30) days of the execution date of this Order, the Respondent receives a contract for sewer service from the City of Cayce, then within sixty (60) days submit to the PSC for approval a contract for sewer service with the City of Cayce, the regional sewer provider.

2. If the contract is approved by the PSC:

   a) Within sixty (60) days of the PSC's final order, submit to the Department administratively complete plans and specifications and an application for a permit to construct addressing elimination of the discharge by connection to regional sewer, including a plan for closure of the WWTF in accordance with Water Pollution Control Permits, 25 S.C. Code Ann. Regs. 61-9.503 (Supp. 2002), Proper Closeout of Wastewater Treatment Facilities, S.C. Code Ann. Regs. 61-82 (1976), and Standards for Wastewater Facility Construction, S.C. Code Ann. Regs. 61-67 (Supp. 2002).

   b) Within forty-five (45) days of the issuance of the permit to construct, begin construction on the connection to regional sewer.

   c) Within one hundred twenty (120) days of beginning construction, complete construction of the connection to regional sewer and divert influent wastewater to the regional sewer system.

   d) Within one hundred eighty (180) days of diverting the influent wastewater to the regional sewer system, close out the WWTF in accordance with the approved plan.

3. If the PSC denies the contract:

a) Within sixty (60) days of the PSC's final order denying the contract, submit to the Department a preliminary engineering report (PER) addressing upgrade of the WWTF to meet the permitted discharge limits.

b) Within sixty (60) days of the Department's approval of the PER, submit to the Department administratively complete plans and specifications and an application for a permit to construct addressing upgrade of the WWTF to meet permitted discharge limits.

c) Within ninety (90) days of issuance of the permit to construct, begin construction of the permitted upgrade to the WWTF.

d) Within two hundred ten (210) days of beginning construction, complete construction of the upgrade to the WWTF and request final operational approval from the Department.

4. Pay to the Department a civil penalty in the amount of twenty-one thousand dollars ($21,000.00), payable in quarterly installments over a period of thirty (30) months, together with interest on the outstanding balance calculated at 8.75% per annum, with the first installment due on May 5, 2003. The Respondent may pay the penalty in full at any time.

IT IS FURTHER ORDERED AND AGREED that where the Department or the PSC has requested information in connection with the above actions, the Respondent shall respond to such requests in a timely fashion.

THEREFORE IT IS FURTHER ORDERED that if any event occurs which causes or may cause a delay in meeting any of the above scheduled dates for completion of any specified activity, the Respondent shall notify the Department in writing at least one (1) week before the scheduled date,

describing in detail the anticipated length of the delay, the precise cause or causes of delay, if ascertainable, the measures taken or to be taken to prevent or minimize the delay, and the timetable by which those measures will be implemented.

The Department shall provide written notice as soon as practicable that a specified extension of time has been granted or that no extension has been granted. An extension shall be granted for any scheduled activity delayed by an event of *force majeure*, which shall mean any event arising from causes beyond the control of the Respondent that causes a delay in or prevents the performance of any of the conditions under this Order including, but not limited to: a) acts of God, fire, war, insurrection, civil disturbance, explosion; b) adverse weather condition that could not be reasonably anticipated causing unusual delay in transportation and/or field work activities; c) restraint by court order or order of public authority; d) inability to obtain, after exercise of reasonable diligence and timely submittal of all applicable applications, any necessary authorizations, approvals, permits, or licenses due to action or inaction of any governmental agency or authority; and e) delays caused by compliance with applicable statutes or regulations governing contracting, procurement or acquisition procedures, despite the exercise of reasonable diligence by the Respondent.

Events which are not *force majeure* include by example, but are not limited to, unanticipated or increased costs of performance, changed economic circumstances, normal precipitation events, or any person's failure to exercise due diligence in obtaining governmental permits or fulfilling contractual duties. Such determination will be made in the sole discretion of the Department. Any extension shall be incorporated by reference as an enforceable part of this Order and thereafter be referred to as an attachment to the Order.

PURSUANT TO THIS ORDER, all communication regarding this Order and its requirements shall be addressed as follows:

Anastasia Hunter-Shaw
Water Enforcement Division
Bureau of Water
SCDHEC
2600 Bull Street
Columbia, S.C. 29201

IT IS FURTHER ORDERED AND AGREED that failure to comply with any provisions of this Order shall be grounds for further enforcement action pursuant to the Pollution Control Act, S.C. Code Ann. § 48-1-330 (1987), to include the assessment of additional civil penalties.

THE SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

_____ **DATE:** 4/7/03
R. Lewis Shaw, P.E.
Deputy Commissioner for EQC

_____ **DATE:** 7 April, 2003
Alton C. Boozer, Chief
Bureau of Water

WE CONSENT

_____ **DATE:** 4/4/03
Midlands Utilities, Inc.

_____ **DATE:** 4/4/03
Attorney for the Department

_____ **DATE:** _____

Valerie A. Betterton

DATE: 4/7/03

Valerie A. Betterton, Director
Water Enforcement Division

APPENDIX B

SC PUBLIC SERVICE COMMISSION ORDER

BEFORE

THE PUBLIC SERVICE COMMISSION OF

SOUTH CAROLINA

DOCKET NO. 2003-217-S - ORDER NO. 2004-202

AUGUST 23, 2004

IN RE: Application of Midlands Utility, Inc. for Approval of a Pending Contract with the City of Cayce for Bulk Service Collection from the Bellemeade Sewage Collection Facility Located in Lexington County, South Carolina.	)))))	ORDER DISAPPROVING CONTRACT

This matter comes before the Public Service Commission of South Carolina (the Commission) pursuant to S.C. Code Ann. Section 58-5-210(1976) and 26 S.C. Code Regs. 103-503 and 103-541 (Supp. 2003) by way of an Application filed by Midlands Utility, Inc. (Midlands) on July 8, 2003, for approval by this Commission of a contract with the City of Cayce (Cayce) for the bulk service collection of sewage from Midlands Bellemeade Sewage Collection Facility. The primary issue for consideration by this Commission is whether the proposed contract is in the public's best interest.

Midlands was represented by Scott Elliott, Esquire and Charles Cook, Esquire and presented testimony from its President Keith G. Parnell. The Consumer Advocate intervened in this matter and was represented by Elliott F. Elam, Jr., Esquire. The Commission Staff was represented by F. David Butler, General Counsel and presented testimony, under subpoena, of Mr. Jeffrey deBessonet of the South Carolina Department of Health and Environmental Control (DHEC).

Two public witnesses appeared before the Commission on this matter. Mr. Kevin Green is a resident of the Bellemeade subdivision and voiced his objection to a

substantial increase in the sewage rates he is currently paying. Mr. John Sharpe is the City Manager for the City of Cayce. Mr. Sharpe testified that there is no pending contract between the City of Cayce and Midlands, although they had entered negotiations and provided Midlands with an estimated cost of providing service to Bellemeade. He further testified that Cayce currently had the capacity to handle the subdivision but that City Council would have to reconsider the capacity issue if the Commission approved Midlands connecting with the Cayce.

Findings of Fact

1. Midlands is a closely held South Carolina Corporation which owns and operates wastewater treatment facilities and sewer facilities in Fairfield, Lexington, Orangeburg, and Richland Counties. Midlands serves approximately 145 residents in the Bellemeade subdivision in Lexington County.

2. Midlands is a public utility as defined in S.C. Code Ann. Section 58-5-10(3) and is under the jurisdiction of the Commission pursuant to S.C. Code Ann. Section 58-5-210.

3. The South Carolina Department of Health and Environmental Control (DHEC) has authority over Midlands in that it regulates the wastewater discharges from the Bellemeade sewage collection facility through the issuance to Midlands of National Pollutant Discharge Elimination Systems Permits ("NPDES Permits") pursuant to the Central Midlands Council of Governments (COG) wastewater treatment management plan (herein the "208 Plan"). The COG is authorized pursuant to Section 1288 of the Federal Water Pollution Control Act (33 U.S.C.A. Sec. 1251; the "Clean Water Act") to

prepare the 208 Plan which is an area-wide waste treatment management plan. The COG's 208 Plan includes area served by the Midlands' Bellemeade facility.

4. In accordance with the provisions of the 208 Plan, Midlands was ordered by DHEC, under DHEC Order No. 03-044-W, to enter into a contract with the City of Cayce to connect the Bellemeade sewage collection facility to Cayce's wastewater treatment facility. The contract demanded by the DHEC Order, however, is subject to the approval of this Commission.

5. Under the DHEC Order, Midlands negotiated with the City of Cayce. The terms offered by Cayce require the payment of a $930 tap fee for each of the 145 residents of Bellemeade to be paid to Cayce for a total cost of $134,850. Midlands would incur additional estimated costs of $334,850 to connect the Bellemeade subdivision facilities to the City of Cayce. Midlands anticipates obtaining financing on these costs payable over 20 years at a 7% interest rate. In addition to these costs, Cayce's operation and maintenance fee will be set at $2.31/1000 gallons per month.

6. We find that based on the above stated costs, and Midlands' collection only residential sewer charge established by Commission order No. 2002-138 in Docket No. 2001-380-S, that the estimated average charges for Bellemeade residents would increase from its current $26.70 to $58.09 per month. This represents a 117.6% increase in rates.

7. We find that Midlands' estimated cost to upgrade the Bellemeade facility to DEHC standards is approximately $350,000. When total costs to include Midlands' expenses, interest cost, depreciation, and construction are complete, Midlands estimates

that the monthly sewer charges to their customers in Bellemeade will rise from the current $26.70 per month to an estimated $39.51 per month, representing a 48% increase in rates.

8. We further find that DHEC Order 03-044-W provides that should this Commission disapprove the Contract between Midlands and Cayce that Midlands will be required to seek a permit from DHEC to upgrade the Bellemeade sewage collection facility and that Midlands complete construction of the upgrade within two hundred forty (240) days of the denial of this Commission.

9. We find that that the testimony reveals that it is in the best interest of the affected customers, and in agreement with the positions of both the Company and the Consumer Advocate, that the Commission disapprove the contract between Midlands and Cayce for bulk service collection from the Bellemeade sewage collection facility.

10. We finally find that the disapproval of the contract in no way authorizes, entitles, or guarantees Midlands an increase or change in the rates and fees charged its customers in Bellemeade and that the Company must request any such increase in a future proceeding before this Commission.

Conclusions of Law

1. We conclude that Midlands is a public utility as defined by S.C. Code Ann. Section 58-5-10(3) and under the jurisdiction of this Commission pursuant to S.C. Code Ann. Section 58-5-210.

2. We conclude that this matter was referred to this Commission by Order of the South Carolina DHEC (Order No. 03-044-W) based on DHEC's ruling that Midlands

had violated provisions of the Pollution Control Act, S.C. Code Ann. Sections 48-1-10 et seq. (1987 & Supp. 2003).

3. We conclude that under the DHEC Order that Midlands was required to file with this Commission, for its approval, a contract for sewer service with the regional sewer provider, the City of Cayce. Under the aforesaid Order, Midlands filed a letter from the City of Cayce setting forth terms of a proposed contract between Midlands and Cayce dated April 4, 2003.

4. We further conclude that the DHEC Order provides for a contingency in the case of this Commission disapproving the submitted contract with the City of Cayce. This contingency requires Midlands to submit to DHEC, within sixty days of the issuance of this Order, plans, specifications and an application for a permit to construct upgrades to the Bellemeade wastewater treatment facility to meet permitted discharge limits.

5. We conclude that based on the provisions of the DHEC Order and the evidence and testimony presented before this Commission in this matter that it is in the best interests of Midlands' Bellemeade customers, and therefore in the public interest, for this Commission to disapprove the proposed Contract and for Midlands to petition DHEC for the appropriate authority and permits to upgrade the Bellemeade sewage collection facility. Based on the testimony and evidence presented to this Commission, that course of action is the most cost effective method of providing the Bellemeade residents with continued sewer service.

IT IS THEEFORE ORDERED, ADJUDGED, AND DECREED:

1. That the contract between Midlands and the City of Cayce is disapproved.

2. That Midlands comply with the terms, conditions, and timelines provided in DHEC Order No. 03-44-W to submit any requisite applications, requests, plans and specifications to DHEC for construction upgrades to the Bellemeade wastewater treatment facility to meet permitted discharge limits.

3. This Order shall remain in full force and effect until further Order of the Commission.

BY ORDER OF THE COMMISSION:

Randy Mitchell, Chairman

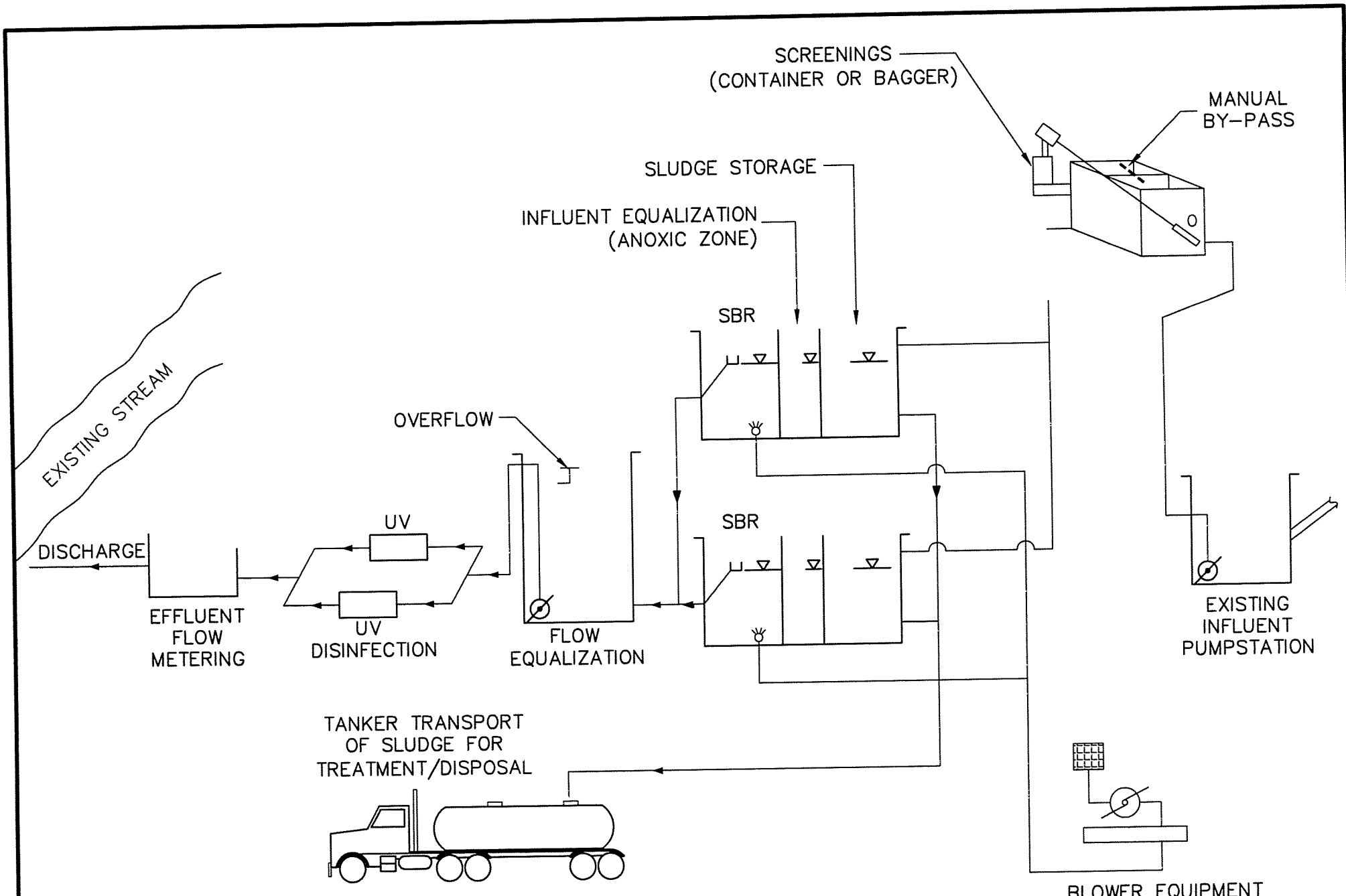
ATTEST:

G. O'Neal Hamilton, Vice Chairman

(SEAL)

APPENDIX C

NEW SBR PROCESS SCHEMATIC



PLANT FLOW SCHEMATIC
BELLEMEADE WASTEWATER TREATMENT FACILITY
(REPLACEMENT FACILITY)

NOT TO SCALE

FILE No. 99074
DATE: JANUARY 2005

APPENDIX D

PROCESS CALCULATIONS

FLUIDYNE CORPORATION

2816 West First Street
Cedar Falls, Iowa 50613
Phone: (319) 266-9967
Fax: (319) 277-6034

Reply to: Fluidyne Florida
2202 Gold Oak Lane
Sarasota, FL 34232
Phone: (941) 342-8915
Fax: (941) 342-9765
E-mail: ptiflorida@aol.com

March 16, 2004

Mr. Ken Parnell
HPG Engineers
1432 Sunset Blvd
west Columbia, SC 29169

Re: Bel Meade WWTP

Gentlemen:

In accordance with the request of Mr. Jim Stanton, Fluidyne Corporation is pleased to offer design calculations, layout drawing, and typical specifications, describing a complete ISAM™ Sequencing Batch Reactor process for the above referenced project.

Fluidyne's ISAM™ SBR is ideally suited to this type of small treatment facility. The ISAM™ process consists of a constant level anaerobic influent conditioning basin, followed by a SAM™ surge basin (influent equalization basin), and one or more SBR basins. In operation, all influent flow enters the anaerobic basin where influent solids are allowed to settle much like a primary clarifier. The influent flow then flows to the SAM™ surge basin (influent equalization basin). Mixed liquor is maintained in the SAM™ surge basin to immediately react with incoming raw sewage to suppress odors and initiate and accelerate carbon and nitrogen reactions. When the level in the surge basin reaches a predetermined level, the jet motive liquid/fill pump is started, and a batch is quickly fed to the reactor basin. When the SBR basin reaches top water level, mixed liquor overflows the proprietary flow and scum control system weir, and is returned to the SAM™ surge basin via the surge jet, and mixed with incoming wastewater in what is referred to as an "Interact" period. Aeration during the interact period is intermittent, and controlled by cycling the pump off and on to accomplish complete biodegradation of the wastewater in the SBR. In addition, during the interact phase, nitrates are recycled to the SAM™ tank for effective and rapid denitrification. Denitrification reactions are accelerated in the presence of the unreacted carbon from the raw sewage entering the SAM™ tank. Aeration and energy requirements are reduced as nitrates are fully reduced to nitrogen gas in the SAM™ tank.

The positive assurance of anoxic followed by aerobic microbial environments in the Fluidyne ISAM™ system conditions the mixed liquor, encouraging highly flocculent microorganisms with optimal settling, compaction, and dewatering characteristics. Since denitrification takes

place in the SAM™ tank the possibility of nitrogen gas bubbles attaching to and floating sludge during the settle cycle is eliminated.

A portion of the motive liquid is also recirculated to the anaerobic chamber. Biological solids settle as the recirculated flow passes through the anaerobic chamber. The recirculated aerobic mixed liquor also prevents the anaerobic chamber from entering the methane producing mode, and prevents the wide pH swings common to other anaerobic processes. The interact period continues until the liquid level in the surge basin rises to the control water level where the pump is stopped and a settle period is begun in the SBR. After the settle period, approximately 24% of the basin contents are decanted.

In addition to providing excellent treatment far exceeding the required standards, the system will also reduce the volume of waste sludge by approximately 80%, compared to a conventional SBR, **and eliminate the need for separate digesters.** Waste solids are stabilized in the anaerobic chamber, and the waste sludge concentration is over 3.5%. With the ISAM™ SBR we predict a total waste sludge volume of approximately 105 GPD of stabilized sludge. In practice, sludge production may be significantly lower; at the John Woods School in Ohio, sludge is wasted only once each school year.

Operating control is simplified: No influent valves are required as flow continually enters the SAM™ tank. Cycle times are reduced as mixed liquor is rapidly pumped from the SAM™ to the SBR tank at the appropriate time greatly reducing fill time.

For seasonal operation, the process is ideal; the interact period never ends until there is another full batch in the surge basin. That means that the system can go into an intermittently aerated holding mode for days, or weeks at a time. Many of our installations are at schools, and ski resorts where huge weekly and seasonal flow variations have no effect on treatment efficiency.

Our design uses our aspirating aerators to eliminate the need for blowers.

This proposal includes a complete ISAM™ SBR system, as described in the design calculations, including:

ISAM™ SBR Process Equipment

Two (2) Fluidyne Model ISAM™ 40 modular prepackaged sequencing batch reactor process systems. The flow train will consist of a three-chambered rectangular tank. The tank will consist of separate compartments for pre-treatment/sludge storage (trash trap tank), flow equalization (anoxic tank), and biological treatment (SBR tank). Each system will be shipped complete and ready for installation on a customer provided concrete pad.

Each ISAM™ packaged plant will include:

Two (2) vertical submersible motive liquid/fill pumps (One is an on-line spare.). Each pump will provide motive liquid for a Model SAA10 aspirating aerator and be furnished

complete with discharge connection, retrieval assembly, guide bars, all accessories, and a 10 Hp submersible motor.

One (1) Fluidyne Model FED300 fixed solids excluding effluent decanter. Decanter will be rated for a maximum flow rate of 300 GPM.

All in-basin air and liquid piping is included.

One (1) Preprogrammed and prewired process control panel. The microprocessor based process control panel will be capable of controlling all of the normal operating requirements of the SBR system based on liquid level and time.

One (1) Float type level monitoring systems.

One (1) Lot of valves, including:

One (1) 4" electrically operated butterfly valve for the decant line.

One (1) 3" manual plug valve for WAS system.

Two (2) manual WAS control ball valves

One (1) SBR overflow weir/scum skimmer. The overflow weir will allow flow from the SBR compartment to flow back to the influent equalization tank during the interact cycle. The weir will also provide scum skimming of the SBR tank. The weir will also provide flow diffusion during periods of extremely high flow.

Supports. All necessary supports for the aeration system, in-basin air and liquid piping, backflush system, and decanter are included.

Hardware. All gaskets, flange hardware, and anchor bolts are included.

Six (6) days of startup and operator training. Provided in two (2) trips to the job site.

Price for two (2) complete ISAM™ 40 SBR systems $249,000.00

Submittal drawings ..... 6 - 8 weeks

Shipment ..... 16 weeks after approval

FOB ..... Shipping points, freight allowed

It is our intention that this proposal includes one complete SBR process system. This proposal does not include:

Installation

Motor starters or related electrical controls except as described.

D.O. control system (optional)

Out-of-basin piping

Sales or use taxes

I trust that the enclosed information will be sufficient for your needs at this time. If you have any questions, or need additional information, please do not hesitate to contact us. Thank you for considering Fluidyne.

Very truly yours,

Fluidyne Corporation,

Glen R. Calltharp

cc: Mr. Erick Mandt
Fluidyne Corporation

Mr. Jim Stanton
Interstate Utility Sales

FLUIDYNE CORPORATION

2816 West First Street
Cedar Falls, Iowa 50613
Phone: (319) 266-9967
Fax: (319) 277-6034

Reply to: 2202 Gold Oak Lane
Sarasota, Florida 34232
Phone: (941) 342-8915
Fax: (941) 342-9765

ISAM™ SBR with Aspirating Jet Aeration System

Design Calculations For

Midland Utilities - Bel Meade WWTP

Jan. 28, 2005

I. DESIGN CONDITIONS:

Design flow	=	80,000	GPD
Peak daily flow	=	200,000	GPD (Assumed)
Peak hourly flow	=	167	GPM (Assumed)
Influent BOD_5	=	220	mg/l
	=	147	lbs./day
Effluent BOD_5	=	10	mg/l
Influent TSS	=	220	mg/l
Removal in anaerobic chamber	=	65%	
TSS to SBR	=	77	mg/l
Effluent TSS	=	10	mg/l
Influent TKN	=	40	mg/l
	=	27	lbs./day
Effluent NH_3-N	=	2	mg/l
Effluent total N	=	10	mg/l
Design MLSS (Full reactor)	=	3,000	mg/l
Design F:M	=	0.09	
SRT (SBR)	=	17	days
SRT (SBR plus SAM))	=	22	days
Elevation	=	200	ft. MSL (Assumed)
Average barometric pressure	=	14.58	psia

II. BASIN DESIGN:

SBR basin	=	2	
Length	=	22 ft.	6 in.
Width	=	11 ft.	10 in.
TWL	=	10 ft.	6 in.
BWL	=	8 ft.	0 in.
Volume	=	41,823	Gallons
Retention time	=	12.5	hrs.

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SAM™ reactor basin	=	2
Length	=	11 ft. 3 in.
Width	=	11 ft. 10 in.
Maximum SWD	=	10 ft. 6 in.
Minimum SWD	=	2 ft. 6 in.
Working volume	=	15,932 Gallons
Anaerobic chamber	=	2
Length	=	11 ft. 3 in.
Width	=	11 ft. 10 in.
SWD	=	10 ft. 6 in.
Volume	=	20,911 Gallons

III. OXYGEN REQUIREMENT:

lbs. O_2 / lb. BOD_5 removed	=	1.25
lbs. O_2 / lb. TKN oxidized	=	4.6
lbs. O_2 recovered/ lb. NO_3 denitrified	=	1.84
Actual Oxygen Required	=	241 lbs./day

Actual to Standard Oxygen Conversion Formula:

$$SOR = \frac{AOR}{\alpha\theta^{(T-20)}\left\{\frac{\beta C_{SMID} - C_L}{C_S\left[1+\frac{0.5\,(D)}{34}\right]}\right\}}$$

Where:

α	=	0.85	β	=	0.95
T	=	20 ° C	θ	=	1.024
C_S	=	9.09	C_L	=	1.0 mg/l

C_{SMID} = Oxygen saturation concentration at 50 % depth at site elevation and temperature.

C_{SMID} = 10.43 mg/l

Therefore:

Standard Oxygen Required	=	334 lbs./day
Peaking Factor	=	1.50
Peak SOR (Design)	=	501 lbs./day

IV. PROCESS DESIGN

Cycle time at design flow	=	2.99 hrs.

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Fill time	=	0.09	hrs.
Interact time (Average)	=	1.24	hrs.
Interact time (Peak Design)	=	1.78	hrs.
Anoxic time (Peak load)	=	0.09	hrs.
Settle time	=	0.75	hrs.
Decant time	=	0.28	hrs.
Total cycle time	=	2.99	hrs.
Total aeration time (Peak Design)	=	1.87	hrs./cycle
	=	30	hrs./day
SOR for aeration design	=	16.7	lbs./hr.
Aspirating jets per basin	=	1	
BHp required per aspirator	=	10.43	
Aspirator model	=	SAA 15 /1	

VI. PUMP CALCULATIONS:

Jet motive/fill pump:

Pumps per basin	=	1	
Flow per pump	=	937	GPM
Total pump head	=	34	ft.
Assumed pump efficiency	=	75	%
BHp per pump	=	10.73	
Pump motor Hp	=	15	

VII. DECANTER SIZING:

Cycles per day	=	16.07	
Batch size	=	4,979	Gallons
Decant flow	=	300	GPM

VIII. SUMMARY:

Design Standard Oxygen Required	=	501	lbs./day
Avg. BHp for 24 hrs. @ Peak SOR	=	13.41	
Power usage (Peak SOR)	=	240	KWH/day
Power usage (Average SOR)	=	160	KWH/day

IX. SLUDGE PRODUCTION CALCULATIONS:

Inert accumulation	=	0.21	lbs./lb. BOD_5 removed
VSS production	=	0.45	lbs./lb. BOD_5 removed
Total sludge yield	=	0.66	lbs./lb. BOD_5 removed

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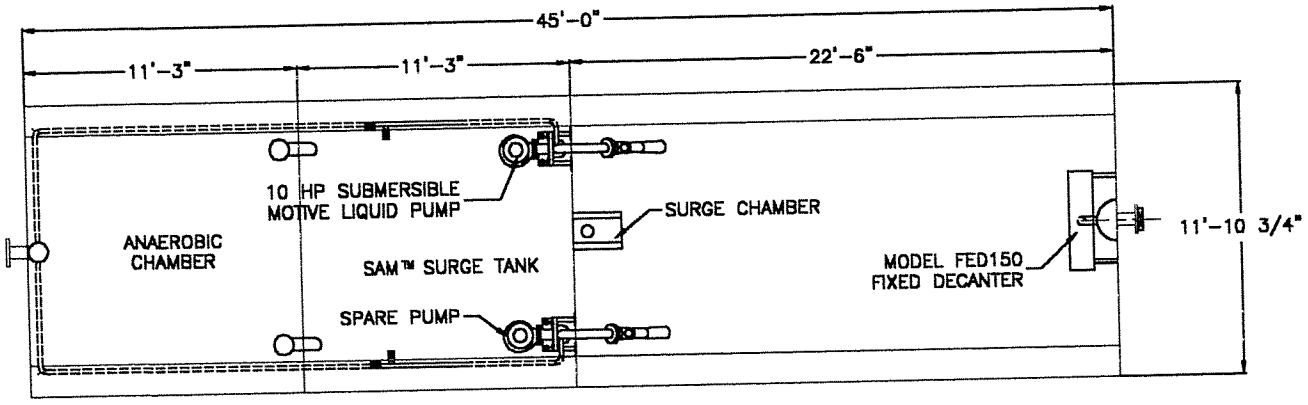
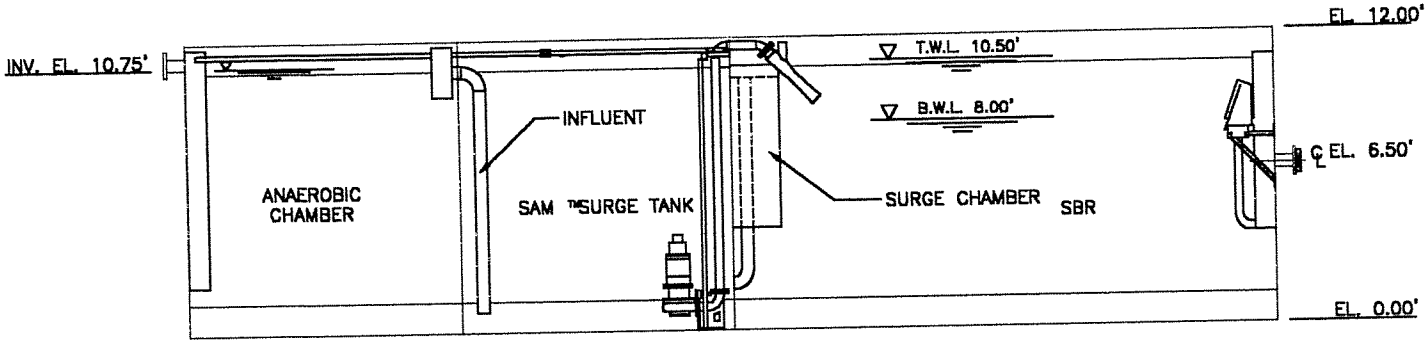
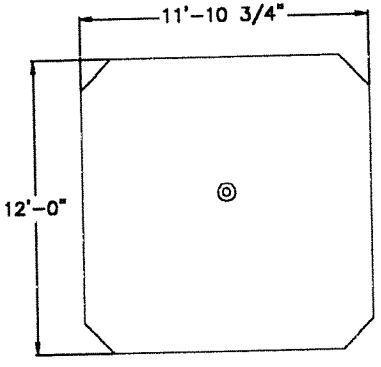
Anaerobic volatile sludge reduction	=	60%
Waste sludge concentration	>	3.5%
Sludge production	=	55 lbs. day
	=	187 GPD
Sludge storage	=	51 days

X. NITRIFICATION/DENITRIFICATION

Minimum mixed liquor temperature	=	12 ° C
Mixed liquor dissolved oxygen	=	1.0 mg/l
Alkalinity required for nitrification	=	207 mg/l
Alkalinity recovered, denitrification	=	57 mg/l
Net influent alkalinity required	=	150 mg/l
Max. nitrifier growth rate	=	0.152 $days^{-1}$
Minimum SRT required for nitrification	=	6.57 days
Actual SRT (SBR)	=	17.00 days
Kn, half velocity constant	=	0.28 mg/l
Des. growth rate for heterotrophs/nitrifier	=	0.059
Projected effluent soluble NH_3-N	=	0.18 mg/l
Specific utilization rate	=	0.20 lbs BOD_5/lb MLVSS
MLVSS required for BOD & NH_3 remova	=	742 lbs.
MLVSS	=	2,100 mg/l
Tank volume req. for BOD & NH_3 remov	=	0.042 MG
Denitrification rate	=	0.038 g/g/day
MLVSS required for denitrification	=	330 lbs.
Tank volume required for NO_3 removal	=	0.019 MG
Total tank volume required	=	0.0612 MG
Total tank volume provided	=	0.0627 MG







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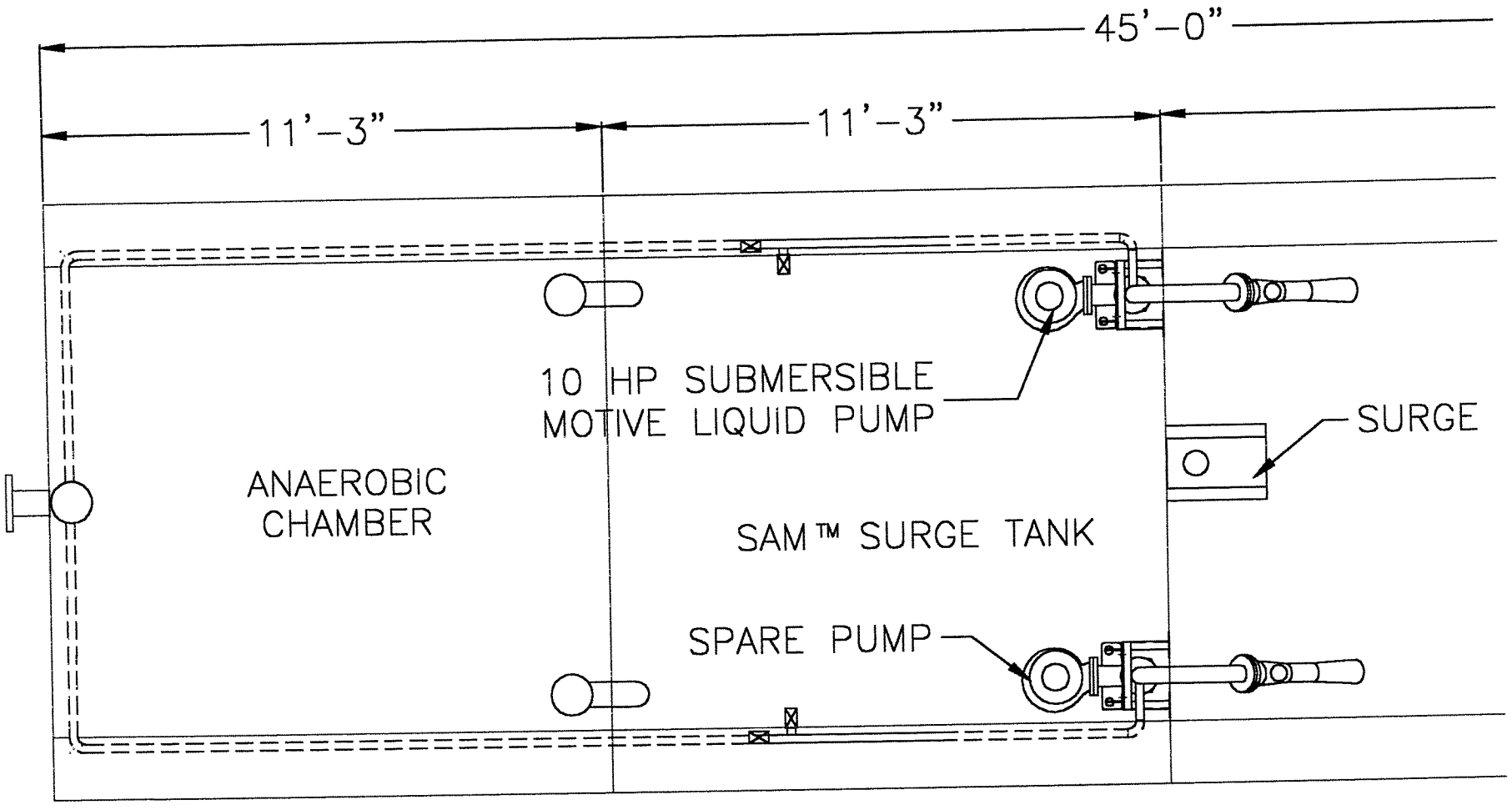
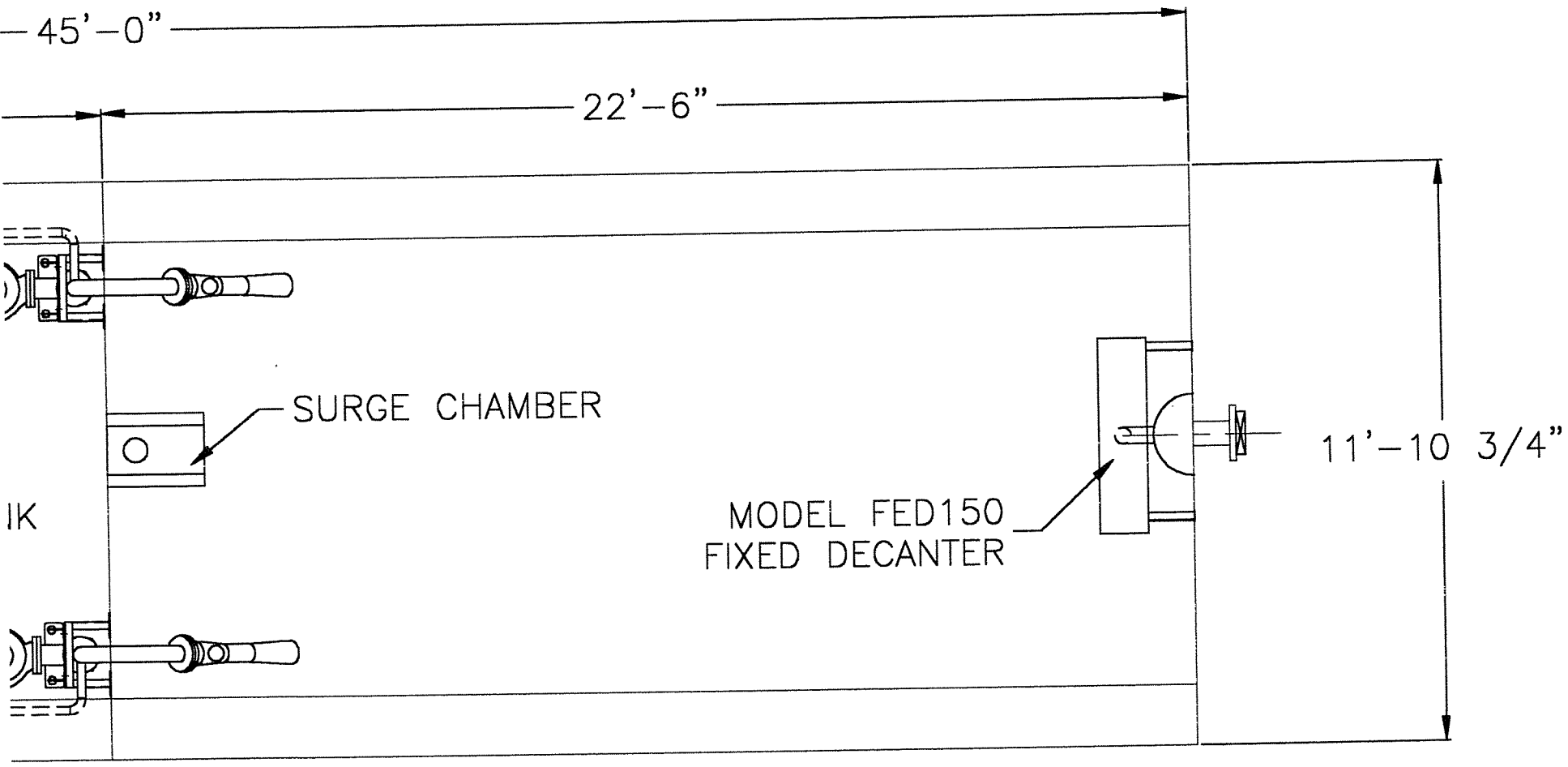
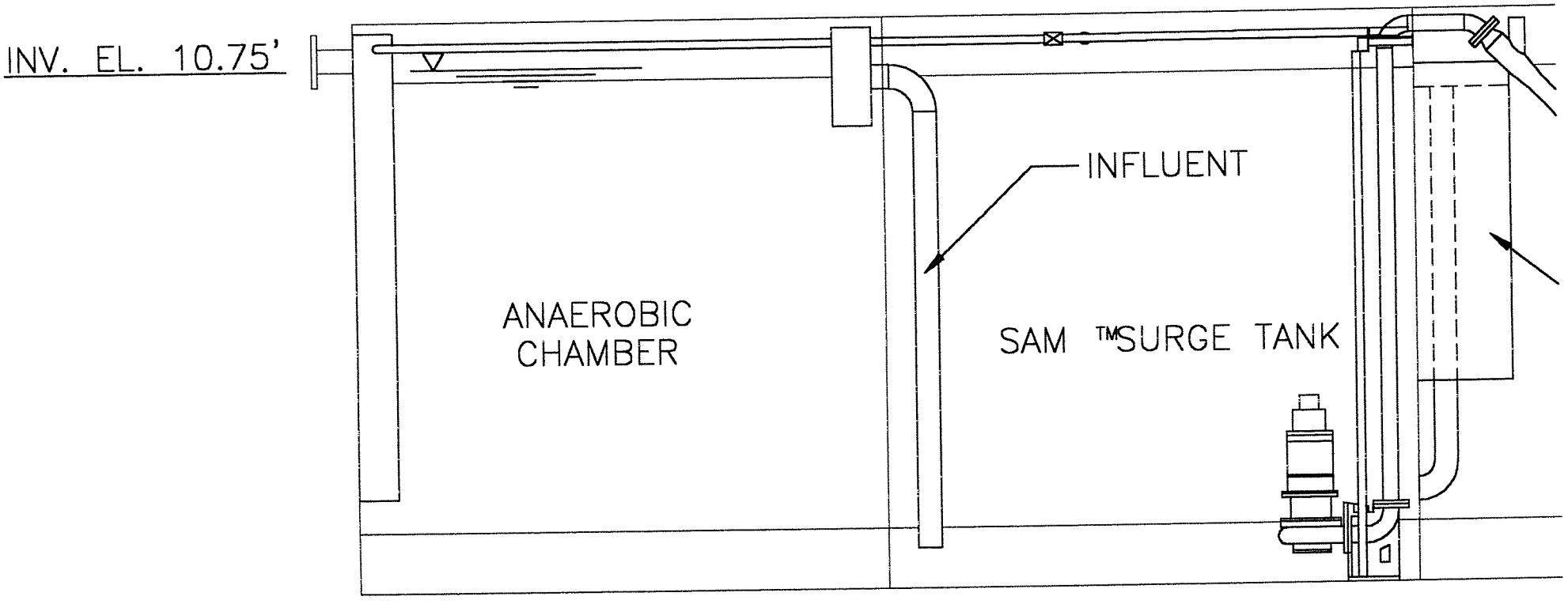
ISAM™ 40
40,000 GPD PREPACKAGED SBR

DRAWN BY:	DWG NO.	REV
GRB	ISAM-04	
DATE 6/11/01	SCALE NTS	SHEET 1 OF 1


45'-0"
11'-3"
11'-3"
10 HP SUBMERSIBLE
MOTIVE LIQUID PUMP
SURGE
ANAEROBIC
CHAMBER
SAM™ SURGE TANK
SPARE PUMP


45'-0"
22'-6"
SURGE CHAMBER
IK
MODEL FED150
FIXED DECANTER
11'-10 3/4"


INV. EL. 10.75'
INFLUENT
ANAEROBIC
CHAMBER
SAM ™SURGE TANK

SPECIFICATIONS FOR
ISAM™ - SEQUENCING BATCH REACTOR
TREATMENT SYSTEM EQUIPMENT

SCOPE OF WORK:

There shall be furnished, as shown on the plans, all operating equipment and special materials complete with all accessories and appurtenances required for a complete wastewater treatment plant plant with integral sludge reduction system. The equipment shall be a ISAM™ – Sequencing Batch Reactor as manufactured and supplied by Fluidyne Corporation, Cedar Falls, Iowa.

WORK SPECIFIED ELSEWHERE:

The Contractor shall coordinate the work specified in this section with the work of other Contractors in order that all necessary items shall be provided as required for satisfactory operation and that the various items of equipment will properly fit and operate in the spaces allotted to them.

SHOP DRAWINGS:

Shop Drawings shall be submitted on all equipment in this Section.

Complete operation and maintenance instructions for all equipment shall be submitted after the Shop Drawings are approved and equipment has shipped.

ELECTRICAL EQUIPMENT

Wiring at a minimum shall be as recommended by the equipment manufacturer unless indicated otherwise on the drawings or required by local codes. Horsepower indicated and/or specified is approximate only and shall be adjusted to provide the specified capacities.

EQUIPMENT INSTALLATION

The installation of all equipment shall be as recommended by the manufacturer to conform to the particular application involved, in accordance with the details shown on the Drawings. Installation of equipment and connections to equipment shall be completed in every detail in a first-class workmanlike manner. All bearings shall be properly lubricated. Prior to acceptance of all or any part of the work, the Contractor shall test each piece of equipment and furnish written certification that it has been installed in accordance with the manufacturer's requirements and is ready to begin operation.

MANUFACTURER'S REPRESENTATIVES

The Contractor shall provide the services of a competent factory trained Engineer for the minimum time period specified in each Section. This Engineer shall represent the vendor supplying the equipment, check the installation, and be present for the start-up. A letter certifying that all of the equipment has been properly installed, lubricated and is in satisfactory operating condition shall be filed by the contractor with the Engineer before the installation can be considered complete. Any additional time required to make this certification shall be paid by the Contractor at no additional cost to the Authority.

The Contractor shall also provide the services of a qualified representative of the manufacturer supplying the equipment for the minimum time period specified in each Section. This manufacturer's representative shall instruct the plant personnel on operation, maintenance, and servicing of each unit of

equipment. The Contractor shall schedule the Vendor's representatives through the Engineer for coordination.

PRODUCT SUBSTITUTIONS

Product substitutions may be proposed by the Contractor only in accordance with procedures set forth herein and only at the time of bid. For product substitutions to be considered the Contractor must submit with his bid complete written details, calculations, drawings, and modifications required on the proposed product substitutions. Product substitutions must be bid as deductive alternates with appropriate cost deductions given on the bid form. Any proposed substitutions for surge/anoxic mix equipment must be accompanied by a referenced list in addition to the information required above. The referenced list shall list at least five (5) successful surge/anoxic mix plants that have operated in true sequencing batch reactor mode (surge/anoxic mix control) with names and telephone numbers of appropriate operating personnel. In addition any alternate manufacturer must provide a cash bond or a performance bond guaranteeing performance of the equipment for a three-year period. The amount of the bond shall be equal to 200% of the installed cost of the ISAM™ equipment. The engineer shall have final say in the approval of any proposed substitutions. The engineer's decision on acceptance or rejection of the proposed substitutions shall be final and binding.

All products provided for the contract, whether named product or substitutions, shall be suitable for the intended function and indicated installation. The cost of any redesign or modifications to accommodate products provided shall be borne by the Contractor.

ISAM ™ SEQUENCING BATCH REACTOR

SBR SYSTEM OPERATION:

The treatment plant shall consist of Number () prefabricated integrated steel wastewater treatment systems. The system shall be a Fluidyne Model ISAM Model. The tanks shall consist of three separate compartments for pre-treatment/sludge storage (trash trap tank), flow equalization (anoxic tank) and biological treatment (SBR tank). Each tank shall be nominally Length in length, Width wide, by Height high. A size influent and effluent flange connection with standard 150 lb. flange connection shall be included to allow the contractor to pipe away from the system. The first compartment (trash trap tank) shall be covered and include a 24" diameter access manway and 3"sludge drawoff with ball valve. The wastewater treatment system shall be placed on a concrete slab at the proper elevation per the drawings.

The tank shall be fabricated out of ¼" structural grade steel plate (ASTM A-569), joined by arc welding with fillets of adequate section inside and out for the joint involved. All walls shall be continuous and watertight and shall be supported by structural reinforcing members where required. The tank shall have reinforcing members on 5' maximum spacing. The entire tank shall be sand blasted to SSPC-SP 6 and 10 with a finish coat of coal tar epoxy inside and out to 8 to 10 mils thickness.

All in-basin piping, valving and supports shall come pre-installed and ready for hook-up by the contractor.

An independent influent control sequence will be used for proper operation. The tank is sent into a timed settle period when a predetermined level is reached. After the settle period ends, the decant is energized, the decant continues until the tank reaches the bottom water level (BWL). Once BWL is reached, the tank returns to the fill cycle.

During the fill and interact cycle there shall be static, and aerobic sub cycles. The sub-cycles shall repeat all during the fill and interact cycle. This feature shall allow the operator to optimize aeration.

General

The Contractor shall have one supplier furnish and deliver the system complete in all details and in strict accordance with the plans and specifications. All equipment within the treatment basins shall be capable

of full operation under completely flooded conditions. General equipment performance requirements are as follows:

INFLUENT WASTEWATER CHARACTERISTICS AND SITE CONDITIONS

Average Dry Weather Flow (ADWF)	ADWF MGD
Peak Flow	PDWF MGD
Peak Instantaneous Flow	PIF GPM
BOD (5 Day-20° C)	BODin mg/l
Suspended Solids	TSSin mg/l
TKN	TKNin mg/l
Temperature Range (Water)	MIN° C to MAX° C
Temperature Range (Air)	MIN° F to MAX° F
Site Elevation	ELEV ft. MSL

EFFLUENT REQUIREMENTS

BOD_5	BODef mg/l
Suspended Solids	TSSef mg/l
NH_3-N	NH3ef mg/l
Total Nitrogen	TNef mg/l

The SBR Equipment Supplier shall guarantee system performance and supply any added equipment including pump and/or blower capacity beyond the minimum specified performance requirements.

JET AERATION (ASPIRATING) SYSTEM:

The equipment shall consist of a diffuser assembly and pump for subsurface operation. Two units shall be supplied to provide 100% standby. Each unit shall be a Model Model designed to transfer the required oxygen per hour to the wastewater at the design depth using atmospheric air provided to the diffuser by an air supply pipe. The pump shall draw liquid from the basin to provide a motive fluid for operation of diffuser.

The diffuser shall consist of a precision formed, fiberglass, tubular nozzle designed for optimum performance under the conditions specified. The diffuser shall be connected to the pump discharge piping with FRP flanges using stainless steel bolts.

SUBMERSIBLE MOTIVE LIQUID PUMPS

The jet motive liquid pumps shall be submersible non-clog sewage pumps capable of being used for jet aeration. An adequate length of Hypalon Jacketed Type SPL cable suitable for submersible pump applications shall be supplied. Each unit shall be provided with the required length of lifting chain of adequate strength to permit raising and lowering the pumps.

IMPELLER The impeller shall be dynamically balanced non-clogging type made of close-grained cast iron conforming to ASTM A48 Class 30. The impeller shall be of one piece, single suction, enclosed,

radial flow design with well-rounded leading vanes and tapered toward the trailing edge for a circular flow pattern. The waterways through the impeller will have extremely smooth contours, devoid of sharp corners, so as to prevent rags or stringy, fibrous material from catching or clogging. The clearance between the impeller outside diameter and cutwater shall be capable of passing a minimum Diameter inch sphere. The impeller is to be statically balanced and secured by means of a bolt, washer, and key. The arrangement shall be such that the impeller cannot be loosened from torque in either forward or reverse rotation. Wiper vanes on the back impeller shroud are not allowed.

VOLUTE AND SLIDING BRACKET The volute shall be matched to the impeller and made of close-grained cast iron conforming to ASTM A-48 Class 30. The volute is to be of one-piece circular constant flow, equalizing pressure design with smooth fluid passages large enough to pass any size solid that can pass through the impeller. The volute shall be side flanged tangential discharge. The volute shall be furnished with large clean-out openings located at the impeller centerline, to allow access to the impeller. The sliding bracket assembly shall be a part of the pumping unit constructed so that when lowered onto the straight thru discharge base, the knifing of the vertical metal-to-metal seal provides a self cleaning, non-clogging, UL listed non sparking assembly. Two guide rails shall be included.

GUIDE RAIL /BRACKET Guide rails shall be provided on which the pump rides when being raised or lowered in the basin. Guide rails shall mount on the straight thru discharge base. The rails shall align the pump with the straight thru discharge base as it is lowered into place. An upper guide rail bracket shall be provided to support and align the rails at the top of the basin.

DISCHARGE BASE The discharge base shall be permanently installed in the SBR Basin along with the discharge piping. The pumps shall be automatically connected to the discharge connection when lowered into place, and shall be easily removed for inspection or service. Sealing of the pumping unit to the discharge connection shall be accomplished by a simple linear downward motion of the pump. A sliding guide bracket shall be an integral part of the pump unit. The entire weight of the pumping unit shall be guided by no less than two guide. The pump, with its appurtenances and cable, shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet. The base shall connect to the discharge piping with a 125 lb. ANSI flange.

SUBMERSIBLE MOTOR Each submersible solids handling pump shall be driven by a completely sealed, electric submersible squirrel cage induction motor of Hp Hp, 1.15 service factor, RPM RPM, 460 volts, 3 phase, 60 Hz power. The motor nameplate horsepower rating shall not be exceeded by the brake horsepower requirements of the specified head and capacity conditions.

The submersible motor shall be UL listed for Class 1, Division 1, Group C and D explosion-proof hazardous locations as defined by the air filled cast-iron, water-tight enclosure which is sealed by the use of O-rings and shall have rabbit joints with an extra large overlap.

The stator winding and lead shall be insulated with moisture resistant Class F insulation for continuous duty in 40° C rise liquids. The motor shall be designed for continuous duty capable of a minimum of ten (10) starts per hour. At the design point the motor shall draw not more than BHp Hp at rated voltage. Motor shaft shall be 416 stainless steel; the rotor is to be dynamically balanced to meet NEMA vibration limits; all hardware shall be stainless steel. Cable leads shall allow the connection of a cable to the motor in the field without soldering. All leads are to be sealed and designed to prevent cable wicking to conduit box located on top of the motor.

SEALS Each pump shall be provided with a tandem mechanical seal system. The mechanical seal chamber shall be oil filled and equipped with a moisture detection device wired internally to the control cable. Each seal shall be held in contact by its own spring system, and shall require neither maintenance not adjustment, but shall be easily inspected and replaceable. The lower seal shall include a protective cup to prevent solids or stringy material from lodging in the seal spring.

BEARINGS The pump shall rotate on a minimum of two bearings permanently lubricated, but capable of

being regreased, suitable for a minimum L10 bearing life of 40,000 hours. Lifting lugs shall be supplied on the motor, sufficient to carry the load of the motor, pump, cable and pull-up attachment. All mating surfaces shall be machined and fitted and sealed with O-rings. Fittings shall be accomplished by metal-to-metal contact between each machine surface, resulting in controlled compression of O-rings without requirement of a specific torque limit. No secondary sealing compound shall be used.

QUALITY ASSURANCE Pumps are to be engineered and manufactured under a written Quality Assurance program. The Quality Assurance program is to be in effect for at least five (5) years, to include a written record of periodic internal and external audits to confirm compliance with such program.

JET MOTIVE LIQUID PUMP CHARACTERISTICS:

Quantity: Number () Flow GPM at TDH ft. TDH, BHp BHP Maximum

SUPPORTS:

All necessary supports for the in basin equipment shall be supplied as part of the system. The supports shall be manufactured of stainless steel.

SBR DECANT EQUIPMENT:

The decanter shall be a stationary decanter of the solids excluding type which prevents solids from accumulating in the decanter header.

The decanter shall be constructed of fiberglass reinforced polyester (FRP) fabricated in complete compliance with PS 15-69 and coated with gelcoat for ultra-violet protection, with a minimum wall thickness of 3/16", or 304 stainless steel.

The decanter shall be capable of decanting Batch gallons of supernatant within a Dec.Time minute period. Maximum withdrawal rate shall not exceed 100 gpm/foot of collector length.

The decanter shall be air operated so as to exclude mixed liquor solids and liquid from entering the decanter during the aerated and/or mixed segments of the SBR operating cycle. The decanter shall be Fluidyne Model Model as manufactured by Fluidyne Corporation, Cedar Falls, Iowa.

All mounting brackets and hardware shall be provided by the Supplier. Hardware shall be stainless steel. Mounting brackets shall be ¼ inch stainless steel.

A one (1) inch decant vent valve for automatic decant shall be provided. It shall be housed in a Nema 4 enclosure with thermostatically controlled heater.

Furnish one Size inch diameter electrically operated butterfly valve to control the decant rate. Valve shall be BAW AWWA C-504 Class 1508 butterfly valve with ANSI Class 1 25 flanged end ASTM A-1 26 Class 6 cast iron body. EPDM seat, cast iron disk with 31 6 stainless steel edge, 304 stainless steel shaft assembled and tested with a 460 volt, 3 phase, 60 cycle open/close service electric actuator. Valve actuator shall include a compartment heater. Each valve shall include manual override with limit switch feedback to the micro-processor in both the open and closed positions. Electrical wiring of the valve shall be in accordance with NEC code requirements.

SBR OVERFLOW WEIR/ SKUM SKIMMER:

A steel overflow weir shall be provided to allow flow from the SBR compartment to overflow back to the influent equalization tank during the interact cycle. The weir shall also provide scum skimming of the SBR portion of the tank. The weir shall also provide flow diffusion during periods of high flow. The entire weir shall be to the steel tank, sand blasted and finished to the specifications as the tank.

WASTE SLUDGE MECHANISM:

A waste sludge mechanism shall be supplied including all piping, valving and supports. Each jet motive pump shall be equipped with a sludge bleed line to allow wasting of sludge back to the trash trap. A 1 ½" manual ball valve shall be included on each line.

CONTROL PANEL

The control panel shall be metal enclosed indoor-type and meet the requirements of NEMA Enclosure Type 1. The panel shall be designed, manufactured, and tested in accordance with the latest applicable standards.

The cycle drives and sequences for the SBR's shall be controlled by an industrial grade programmable controller. The PLC's shall be housed in the control panel supplied by the SBR manufacturer to provide unit responsibility. The control panel shall be shipped completely factory wired, assembled and factory tested simulating all inputs and outputs.

Switches and lights shall be supplied to operate all electric valves, mode selection, and cycle indication in both manual mode and automatic mode. All lights and switches shall be industrial grade, oil tight Square D or equal.

The PLC shall contain a central processing unit, a CMOS RAM memory power supply, inputs and outputs. The unit shall have five diagnostic indicators; PC Run, Communication, CPU Fault, Forced 1/0 and battery Low. The unit shall have a 16K-word user memory contained within CMOS RAM with capacitor and battery back up capable of 2 to 3 year memories back up. The unit shall be equipped with removable EEPROM non-volatile memory back up. The processor shall be an Allan Bradley SLC5/03.

Expansion units to provide additional input and output capacity shall be provided as required.

Each PLC unit shall be provided with a Data Table Access Module DTAM mounted on the front of the control panel. The DTAM shall have a key switch to allow the operator to monitor or modify the timer-counter set points. The unit shall have a two-line character supertwist nematic LCD with LED backlit display. The keyboard shall be a 9-place pressure sensitive keyboard to access and enter data and addresses.

The control system shall provide automatic sequence of the SBR's tanks.

SBR LEVEL CONTROLS:

Tank level controls shall be of a non-invasive type suitable for the intended purpose in a hostile environment. Each detector shall be independently adjustable and provide a distant signal at the selected level. Level sensors shall have a load capability of 5 A each 117 VA. The level sensor shall be of the weighted suspended float type suitable for use in sewage.

A separate float or level sensor shall be supplied for proper operation of the SBR and the equalization tanks. A 304 stainless steel bracket shall be included to position the floats at the correct level.

Each equalization tank shall be provided with three floats:

Low Water Level –

Mid Water Level –

High Water Level –

Each SBR tank shall be equipped with two floats:

Bottom Water Level –

Top Water Level –

OTHER SERVICE AND EQUIPMENT:

The installing contractor shall perform the following:

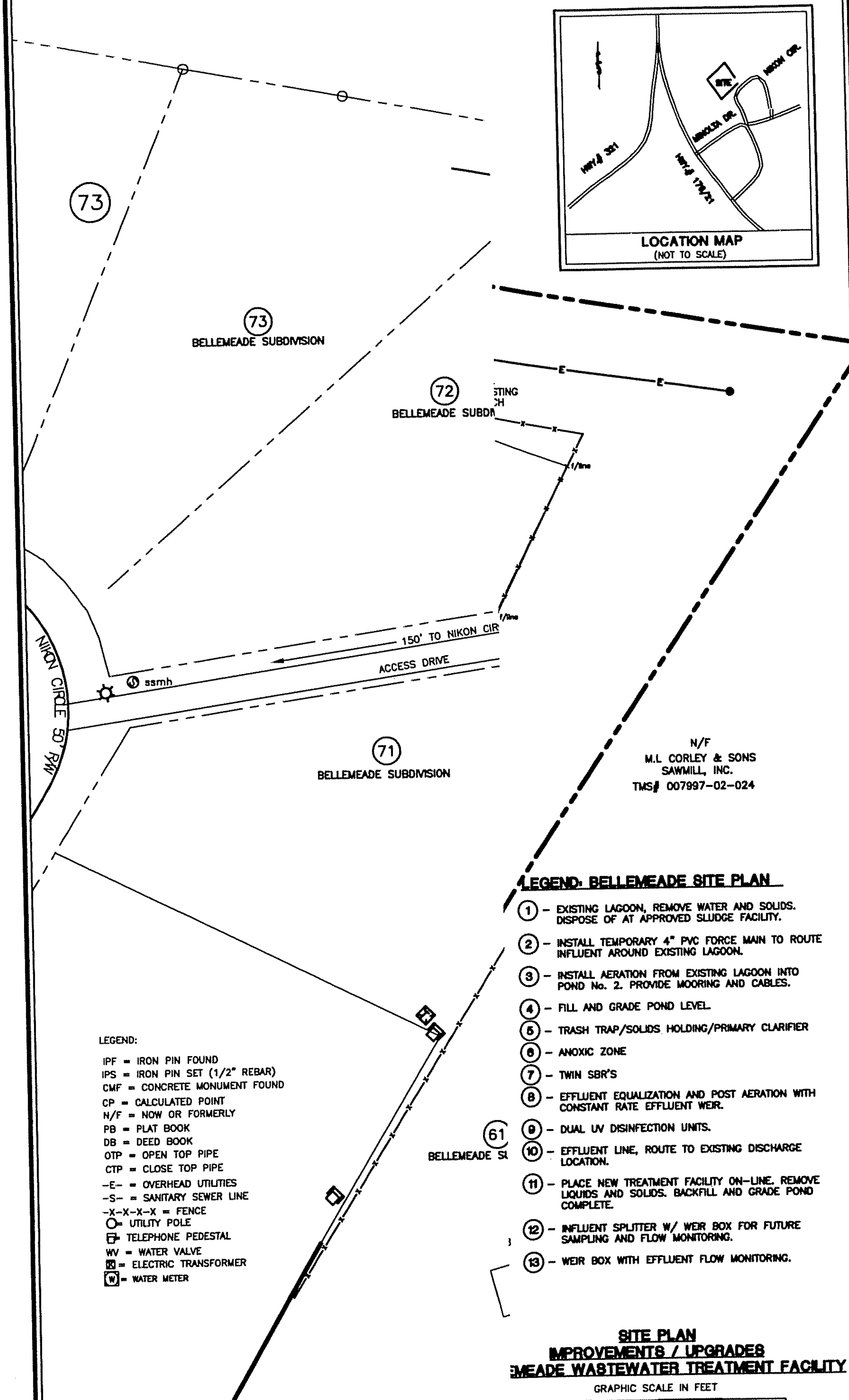
1. Field unloading and setting of the system on the foundation pad and anchoring in position.
2. Assemble into position, at the location shown on the plant, the ancillary equipment that has been disconnected at the factory for shipping purposes.
3. Interconnection of piping and wiring which may have been disconnected at the factory for shipping purposes.
4. Tie-in of all piping, power and wiring connection to site utilities. The power required at the main power supply is 460 volt, 3 phase, 60 Hz.
5. Furnish foundation pad upon which to set the system.
6. Place tankage square on pad, Crane capacity of Capacity pounds minimum.
7. Touch-up painting of areas damaged during installation.
8. Filling tank to the proper level to prevent flotation.
9. Any remote panels or disconnects required for local codes or to meet job requirements.

FIELD SERVICE AND TRAINING:

The Contractor shall provide the services of a factory trained Engineer who has at least three years factory experience in jet aeration equipment. The factory engineer shall be qualified to supervise installation, test for proper installation, conduct start-up, and train operator in the operation of the equipment and the process. A minimum of Hours (#) hours on the job site in a minimum of Trips (#) trips shall be provided.

APPENDIX E

CONCEPTUAL SITE PLAN FOR NEW SBR PLANT



LEGEND:

IPF = IRON PIN FOUND
IPS = IRON PIN SET (1/2" REBAR)
CMF = CONCRETE MONUMENT FOUND
CP = CALCULATED POINT
N/F = NOW OR FORMERLY
PB = PLAT BOOK
DB = DEED BOOK
OTP = OPEN TOP PIPE
CTP = CLOSE TOP PIPE
-E- = OVERHEAD UTILITIES
-S- = SANITARY SEWER LINE
-X-X-X-X = FENCE
UTILITY POLE
TELEPHONE PEDESTAL
WV = WATER VALVE
ELECTRIC TRANSFORMER
W = WATER METER

LEGEND: BELLEMEADE SITE PLAN

1. – EXISTING LAGOON, REMOVE WATER AND SOLIDS. DISPOSE OF AT APPROVED SLUDGE FACILITY.
2. – INSTALL TEMPORARY 4" PVC FORCE MAIN TO ROUTE INFLUENT AROUND EXISTING LAGOON.
3. – INSTALL AERATION FROM EXISTING LAGOON INTO POND No. 2. PROVIDE MOORING AND CABLES.
4. – FILL AND GRADE POND LEVEL.
5. – TRASH TRAP/SOLIDS HOLDING/PRIMARY CLARIFIER
6. – ANOXIC ZONE
7. – TWIN SBR'S
8. – EFFLUENT EQUALIZATION AND POST AERATION WITH CONSTANT RATE EFFLUENT WEIR.
9. – DUAL UV DISINFECTION UNITS.
10. – EFFLUENT LINE, ROUTE TO EXISTING DISCHARGE LOCATION.
11. – PLACE NEW TREATMENT FACILITY ON-LINE. REMOVE LIQUIDS AND SOLIDS. BACKFILL AND GRADE POND COMPLETE.
12. – INFLUENT SPLITTER W/ WEIR BOX FOR FUTURE SAMPLING AND FLOW MONITORING.
13. – WEIR BOX WITH EFFLUENT FLOW MONITORING.

SITE PLAN
IMPROVEMENTS / UPGRADES
[B]EMEADE WASTEWATER TREATMENT FACILITY

GRAPHIC SCALE IN FEET
20' 0 20' 40' 60'
SCALE: 1" = 20'

REVISIONS	DATE	BY

APPROVALS
DESIGNED CKP
DRAWN LBK
CHECKED CKP
APPROVED CKP

SEAL: SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER No. 9405 CHARLES K. PARNELL

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HPC and Company Consulting Engineers, Inc.
2377 NO2 SUNSET BLVD. WEST COLUMBIA, S.C. 29169

PROJECT DESCRIPTION
BELLEMEADE WASTEWATER TREATMENT PLANT FACILITY UPGRADES
OWNER: MIDLANDS UTILITY
LOCATION: BELLEMEADE COUNTY: LEXINGTON

DRAWING TITLE
SITE PLAN
TREATMENT PLANT IMPROVEMENTS/UPGRADES
DATE: APRIL 2003
SCALE: AS SHOWN

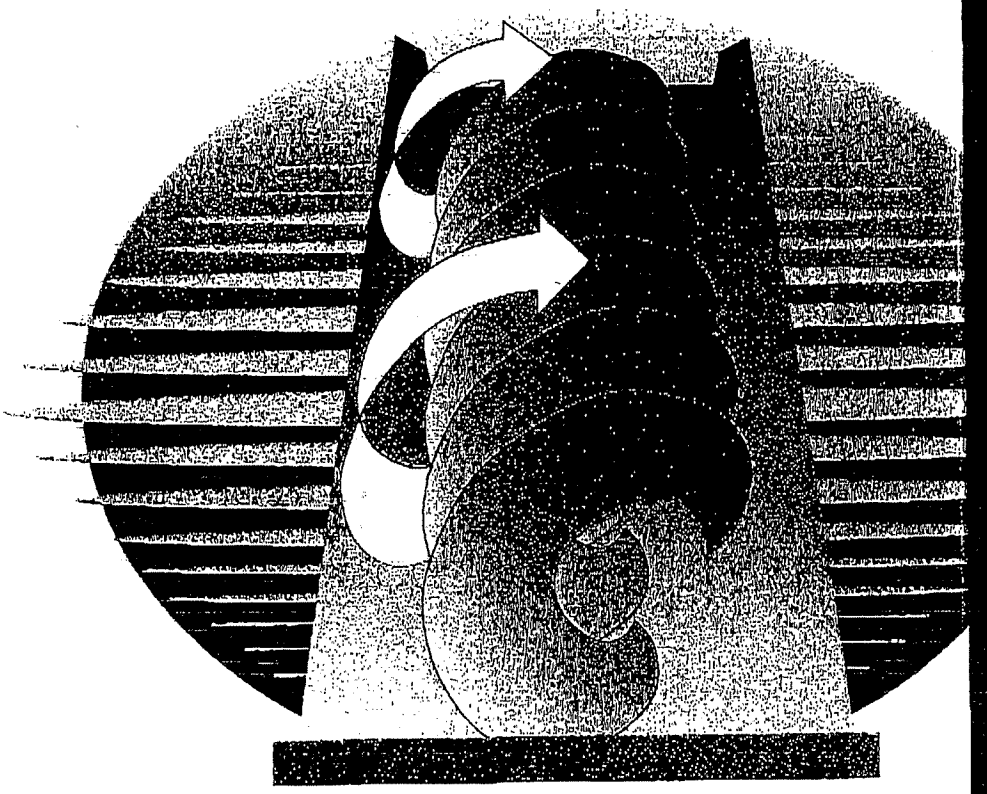
SHEET 1 OF 1
PROJECT NO: 98011
FILE NO: 98011
FILE NAME: UPGRADES
R012705

EXHIBIT 4

Depreciation Exhibit Relative to Wastewater Treatment Plant or SBR's Life Cycle

Design of Municipal Wastewater Treatment Plants

Volume I



WEF Manual of Practice No. 8

ASCE Manual and Report on Engineering Practice No. 76

PROCUREMENT

CONTRACTUAL APPROACHES. Design- and construction-related activities described in Table 2.1 represent what may be termed the classical architect/engineer approach. With this approach, vendor-furnished equipment is procured according to performance or prescriptive equipment specifications through contractors who are bidding from plans and specifications prepared by a consulting engineer.

All funding and ownership of facilities rest with the owner in the classical architect/engineer approach. The owner may also elect to procure program administrative, design, and construction management services in complicated projects.

Alternate contractual approaches may incorporate turnkey or a combination of turnkey and architect/engineer procurement of desired facilities. The term "turnkey" applies if a single entity assumes total responsibility for plant design, construction, start-up, and sometimes financing. The approaches and their relative merits are presented in Table 2.4.[4] All involve the activities of a design team in some capacity.

In a turnkey approach, the owner cannot escape the risks associated with changing regulations and wastewater variability. Legal counsel should be sought early and used throughout the preparation of turnkey contracts. Conflict in turnkey projects results most often from the owner's failure to define clearly the expectations in terms of performance and quality of goods and services.

Privatization, the involvement of nonpublic and entrepreneurial interests in project development and system operation, provides another option for procurement of project needs. In the most comprehensive of three general alternative approaches to privatization, the private enterprise provides all required engineering, construction, funding, and operational services. These are covered by contractual arrangements between the municipal owner and the developer as to specific responsibilities and remuneration. This approach would critically depend on existence of favorable federal tax incentives for the developer. Such incentives do not presently exist. As another option, a municipality could design, build, and sell the facility or enter into a sale or leaseback agreement with a private corporation. As the third approach involves more limited private sector participation, private sector operating services may be obtained for a facility designed and built by the municipality or municipal agency.

SPECIFICATIONS. Two general types of specifications are used to procure goods and services for construction of a municipal project under any procurement option: the prescriptive and the performance specification.

mation also suggests that even the perfect design will not perform adequately without informed operation and responsible administration and, most importantly, reliable solids disposal based on the daily needs of the plant.

FACILITY DESIGN REQUIREMENTS

A design may be functionally correct but fall short of expectations if it fails to account for start-up conditions, potential future expansion of the plant, the convenience and safety of the plant employees, and the plant's impacts on its surroundings.

PRESENT AND FUTURE DESIGN REQUIREMENTS. Reasonably accommodating the needs during the initial years of plant operation must be properly balanced with those of the future. In most cases, completely accommodating the objectives of any part of this time span will compromise those of another part. Experience has proved that the design should primarily accommodate the design year projected conditions, with allowances for (1) proper operation when loading conditions may be significantly less than design year loadings and (2) expansion or rehabilitation to handle loadings reasonably anticipated beyond the design year. Achieving the proper balance between the design period and the future sometimes creates a dilemma. In many cases, disregard for the future beyond the design year has resulted in abandonment of the original facility at great cost to the community. In other cases, an overly intensive design focus on an uncertain future beyond the design period has resulted in facilities with operations, maintenance, or performance shortcomings during the design period.

Because the reliability of loading projections declines as the time span of the projection increases, a facility process or layout commitment to an uncertain distant future deserves careful scrutiny if it would significantly compromise system operation during the first 15 to 20 years after start-up. As another consideration that reduces the reliability of commitments to the future, future changes in regulatory requirements or treatment technologies could invalidate assumptions underlying the future commitment. Nonetheless, the design of any treatment works should consider the likelihood that most plants will eventually be rehabilitated, upgraded, or expanded, regardless of the design period or the anticipated service lives of plant facilities. Recognition and reasonable accommodation of inevitable change and replacement is a key responsibility of the owner and the design engineer. With prudence and foresight, future plant modifications can be made easily and economically. Table 3.3[3] summarizes considerations involved in planning for the future beyond the design period. Chapters 4, 5, 7, and 8 provide additional relevant information.

The operation of facilities is the main consumer of energy at treatment plants. Because energy consumption of different unit processes and operations varies greatly and because there are innumerable combinations possible, data must be available for each prospective treatment operation or process considered.

The main energy sources are (1) electric power, (2) either natural gas or propane, and (3) diesel fuel or gasoline. Electric power is used mainly for running the electric motors for the process equipment and for providing lighting and power for various ancillary support systems. Natural gas or propane is used for building and digester heating and is used as a fuel source for standby engine-generators. Diesel fuel or gasoline is used similarly for standby engine-generators and for vehicle fuel. Particular attention needs to be paid to the electrical energy costs because of the complex pricing structure used by utilities.

Electrical energy charges are commonly assessed based upon energy use, power factor charges, and demand charges. Power factor charges are concerns for plants having large electric-motor driven equipment. The demand charges are assessed by the utility companies when they commit sufficient power-generating capacity to meet the entire demands of the treatment system. Peak power use for as little as 15 minutes may establish a demand charge for up to 12 months. Demand charges can be reduced in some instances by providing power-generating capability at the treatment plant. The recovery and use of digester gas for meeting energy needs and reducing demand is one example of how both user charges and demand charges can be reduced with resulting cost savings to the treatment plant (see Fig. 4-2). Digester gas use is discussed in more detail in Chap. 12. As part of an energy cost evaluation, a sensitivity analysis should be considered to assess the impacts of future changes in energy costs on the overall cost of operation for the treatment facilities.

4-5 IMPLEMENTATION OF WASTEWATER MANAGEMENT PROGRAMS

A program for the implementation of a wastewater treatment project has several major steps, usually consisting of (1) facilities planning, (2) design, (3) value engineering, (4) construction, and (5) startup and operation. Most major projects having a construction cost over $10 million follow all steps. Smaller projects (less than $10 million) may not include the value-engineering step, although some simplified form of value engineering is highly desirable.

Facilities Planning

A facilities plan is a document established to analyze systematically the technical, economic, environmental, and financial factors necessary to select a cost-effective wastewater management plan. The facilities plan itself may include an environmental impact assessment; on major projects, the environmental assessment is usually a separate document. The scope of the facilities plan includes (1) defining the problem; (2) identifying design year needs (usually at least 20 years); (3) defining, developing and analyzing alternative treatment and disposal systems; (4) selecting a plan; and (5) outlining an implementation plan including financial arrangements and a schedule for

Same Reference Source.

hazards to personnel. The construction contract must define clearly how these issues are addressed.

In selecting materials of construction, three principles are fundamental to the engineering design of process oriented facilities: (1) durability—the life of the equipment is expected to last at least 20 years and structures, 30 to 40 years; (2) good quality materials and equipment to minimize maintenance and replacement; and (3) environmental suitability, realizing that wastewater and its attendant chemicals are corrosive. For these reasons, most process structures are constructed of reinforced concrete and other materials of construction are selected based upon their corrosion-resistant properties. For information about materials of construction for wastewater treatment plants, Ref. 23 may be consulted.

Construction and Program Management. Management techniques used to ensure timely construction of the project in accordance with the plans and specifications include construction management and program management. Construction management usually provides for review of the contract plans and specifications and a management overseeing of the construction contractor's operations. The purposes of construction management are to (1) verify the technical adequacy, operability, and constructability of the plans and specifications before construction begins; (2) establish construction schedules consistent with the program objectives and to optimize cash resources; (3) review the contractor's operation to ensure conformance with the plans and specifications; and (4) control change orders and possible construction claims. Program management differs from construction management in that it provides a single source of responsibility and authority (accountable to the owner) for the management, planning, engineering, permitting, financing, construction, and startup operations of the total wastewater management program. Program management is often used in very large projects or projects that are privatized (see Sec. 4-6).

Startup and Operations

Some of the principal concerns in wastewater engineering relate to the startup, operation, and maintenance of treatment plants. The challenges facing the design engineer and the treatment plant operator include the following: (1) providing, operating, and maintaining a treatment plant that consistently meets its performance requirements; (2) managing operation and maintenance costs within the required performance levels; (3) maintaining equipment to ensure proper operation and service; and (4) training operating personnel. Therefore, the design has to be done with the operations in mind, and the plant has to be operated in accordance with the design concept. One of the principal tools used for plant startup, operation, and maintenance is the operations and maintenance (O&M) manual. The purpose of an O&M manual is to provide treatment system personnel with the proper understanding of recommended operating techniques and procedures, and the references necessary to efficiently operate and maintain their facilities. The design engineer usually has the lead responsibility in

Source : Wastewater Engineering Treatment Disposal and Reuse, Third edition, Metcalf & Eddy, INC.

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January 19, 2005

Mr. Ken Parnell
HPG
1436 Sunset Blvd
West Columbia, SC 29106

Re: Plant Life

Mr. Parnell:

Your question regarding the expected life of a plant involves two factors: continually changing regulation and equipment wear.

Regulation

Plants are affected by changes in regulation to the point that a small plant may be obsolete long before the plant wears out. Increasingly tighter effluent regulations will require changes in processes and/or addition to the processes to accomplish previously unidentified permit requirements. In the Charleston area, a recent regulatory requirement for permitting based on the Ultimate Oxygen Demand was fought in court to stop implementation. If the new regulation comes into force, all major plants affecting the Charleston Harbor will require major improvements to limit nutrient discharges. Current nutrient limits are expected to change in the next five years including a tighter limit on nitrogen and phosphorous based on similar actions taken in other states.

Plant Wear

Plants wear due to the harsh environment and constant duty service. Internals in plants will require replacement. Manufacturers suggest a typical twenty year life is the best estimate of plant life expectancy. Some internal components such as polymer based diffusers have a life expectancy of 5-7 years before major replacement. Submersible pumps used in plants have a life expectancy of five to seven years. While the steel or concrete structure may last longer than twenty years if properly maintained, the internals of a plant will require replacement before twenty years.

Industry Standard Life Cycle Cost Analysis and Financing

When a life cycle analysis for a plant is required in the bid document to verify the true cost of a plant, the analysis is based on a twenty year life. The life span is required in bid documents prepared by the nation's largest engineering firms and utilities in the country. The Dorchester County WWTP Upgrade Evaluation was completed on a twenty year basis for cost analysis. When plants are financed, typically a twenty year term is used as the basis for financing since it is the industry standard and the borrowers do not feel comfortable extending the term past twenty years.

In summary, the industry standard life for a wastewater treatment plant is twenty years.

Please call with questions or comments.

Sincerely,

Jim Stanton
Interstate Utility Sales, Inc.

Combs & Associates, Inc.

Post Office Box 32185 • Charlotte, North Carolina 28232-2185
(704) 374-0450 • Fax (704) 375-6618
tonycombs@combs-associates.com

January 19, 2005

HPG, Consulting Engineers
Attention: Mr. Ken Parnell
1432 Sunset Blvd.
West Columbia, SC 29169
Telephone 803-739-2888
Telefax 803-739-2277

Re: Bush River Wastewater Treatment Plant
Equipment Design Life Analysis

Dear Mr. Parnell:

We represent the wastewater treatment plant equipment that you have drawn and specified for the Bush River Wastewater Treatment Plant. I would like to confirm that a twenty-year design life is our industry standard for this equipment. Consideration of a design life of over twenty years for this equipment is unreasonable.

I earned a Bachelor of Science and a Master Degree in Civil Engineering from North Carolina State University. I am a Registered Professional Engineer in North Carolina. I have been involved in water and wastewater equipment design and sales in the Carolinas constantly since 1976. My company's water and wastewater treatment equipment sales vary from ten to twenty million dollars per year.

Cost effective evaluations of equipment designs using this type of wastewater treatment equipment use a twenty-year design life. Present worth analysis using this type of wastewater treatment equipment along with its power consumption and maintenance cost use ten to twenty year life.

I work with numerous water and wastewater consulting engineering firms in the Carolinas who constantly analyze equipment in their selection of products for water and wastewater treatment plants. I have never been involved in a cost analysis that used over twenty years for the design life of wastewater treatment plant equipment.

Please contact me if I can be of further assistance.

Sincerely,

Anthony R. Combs, PE
President
Combs & Associates, Inc.